THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. MARCH 7, 1895. CHICAGO, ILL. NUMBER 10.

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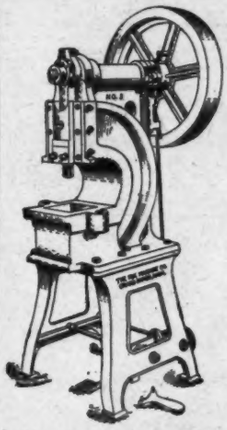

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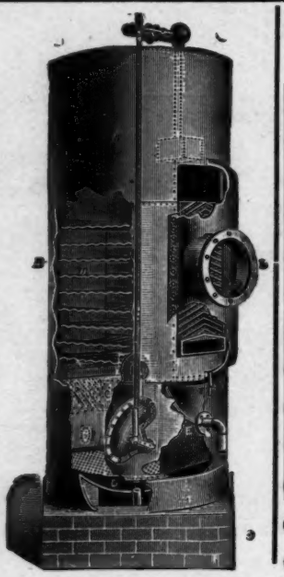

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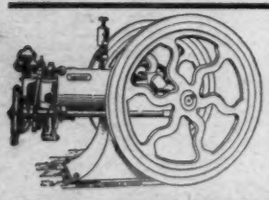

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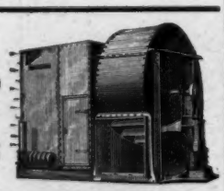

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. MARCH 7, 1895. CHICAGO, ILL. NUMBER 10.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Whatever doubt existed as to the ability of producers of Lake Superior Bessemer ores to agree upon a basis for 1895, both as to prices and production, that would prevent a repetition of the sorry experience of last year, has been removed. The attitude of steel makers is yet to develop; but whether the large buying is pushed into the navigation season, and purchases made meantime from the docks, or contracts entered into within 30 or 60 days for a year's supply, on the new price basis, the result will be practically the same. The one alternative will clear away dock stocks which must be got out of the way in any event, and the price on which will be the same as on new ore. The advance in Bessemer pig resulting from the heavy Pittsburg and valley buying of the past two weeks, means 40 cents more than the lowest transactions reported since the first of the year, $9.20 at valley furnace having been done at the depth of the slump. The market today is difficult of exact statement, but on prompt shipment the range is fairly $10.15@$10.25 Pittsburg, with sellers unwilling to contract largely for future deliveries, especially in view of the coal strike declared this week and the possibilities of trouble in the coke region. It is argued that higher Bessemer ore and higher coke after April 1, sustain the view that, with the accumulated stocks taken up by recent purchases, the low level for Bessemer pig in January and early February will not be touched again. The price of coke will be a larger factor, however, than that of ore, in the next three months, since many consumers of Lake Superior Bessemers, who bought a year's supply last year, now have more than the usual spring stock owing to the coke-strike stoppage. The principal development of interest to makers of Southern iron is the demand soon to come up from Eastern pipe contracts. The East River Gas Co. is in the market for 6,000 tons; Boston will buy 9,000 tons of Jersey City, Washington and Philadelphia requirements carry the total up to 50,000 or 60,000 tons. The iron that will be bought to cover these requirements will relieve the furnaces from some of the pressure of growing stocks, but there appears no indications of such a demand from foundries and mills as would be needed to change prices for the better. Structural material contracts continue to give good promise for the season's building. A 5,000 ton order for the new Buffalo building went to Pittsburg, and St. Paul has two building enterprises awaiting bids, with a third pending. The car buying by important railroad lines is only an indication of what would be done by others were their financial ability equal to their needs. The statement of the Pennsylvania Co. for 1894, showing a falling off in gross revenues of the entire system, of $16,000,000 from 1893 and a reduction of $13,000,000 in expenses, or a loss of $3,000,000 in net results, gives the key to the railroad situation and calls for no elaborate comment.

THE CLEVELAND OUTLOOK.

With the opening of navigation only six or seven weeks ahead, there is an unwonted scarcity of lake freight talk. No new ore has been sold, and the mining interest has no need to discuss rates, so that the situation resolves itself into a wait for developments, with the furnacemen's course of action as the leading unknown quantity. The policy of the old range producers of Bessemer ores is no longer in doubt, and the nominal advance over 1894 prices, with such safe-guards against over-production as are necessary to make it effective, can be counted on as factors in the cost of Bessemer pig iron after all the Lake Superior Bessemer ores now in furnace yards or lying on dock subject to the order of furnaces owning them, have gone into furnace mixtures. In some cases furnaces whose operations were interrupted by the coke strike last Spring and Summer, have ores on hand to last for several months. Other producers of Bessemer pig metal, if they maintain their customary mixtures, will have to come to market for certain standard ores by the opening of navigation. They may conclude to buy dock lots for a time, but on such purchases it is understood that the new price will be paid, and all ore so taken will assist so far in clearing up the situation. If this policy is pursued by a few strong buyers, it will result in taking out of the account the uncertainty about sold and unsold dock stocks that has always cut a considerable figure in the annual see-saw between ore men and furnacemen. No recent pickup transactions are reported, but the shipments from docks to furnaces have been increasing, and the early addition to the list of Bessemer pig-makers of one valley furnace that has never made Bessemer before, means an additional draft upon Bessemer ore stocks.

Pig Iron. An inquiry for Bessemer iron for shipment into the Cleveland district has come up in the week, and the offer of $10, Cleveland, has been made by the intending purchaser, with no sales closed as yet. The negotiations are conducted by way of a Philadelphia sales agency. Valley furnacemen, three of whom sold at $9.60 in the valley, for delivery at Pittsburg, 10 days ago, say they are not now willing to sell for far forward delivery, owing to the imminence of a new deal on coke. In one case an offer of $9.55 for iron now in stock was refused. The expectation now is that the Lorain steel plant will be making billets in April and the purchases thus far made will not be measured up to the converting capacity that will be effective from the start. Some small transactions in Bessemer pig the past week are reported by way of Pittsburg at $10.15. Foundry iron does not gain strength. Quotations are made at $10 for No. 1 and $9.25 for No. 2 in the valley, but these prices have been shaded. Gray forge continues weak and some producers are holding stocks rather than sell at going prices, which mean $8.40 @ $8.50 in the valley.

Finished Material. The rails for the electric lines to be known as the Lorain & Cleveland and the Akron, Bedford & Cleveland—1,800 tons for the former and 3,500 tons for the latter, were bought the past week, the Lorain interest taking the business. It is understood, however, that the T rails will not be rolled by the seller. Another local building calling for a round lot of structural steel, is soon to go up, but current orders for beams and channels and plates are of very moderate volume.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Business in the past week has been rather quiet, a little better, possibly, than during the week previous, but not much. The feeling of confidence noted last week seems to be ruling still, and is even more pronounced than it was then. This may be partly due to the feeling that at least no harm can be done by Congress, now that it has adjourned, but it is partly traceable to the fact that there appears to be more of a disposition among some of the larger buyers to make their purchases of greater volume than they have been doing for some time past. Some of the larger foundries, for instance, are at least considering the advisability of buying iron for more than their immediate needs, on longer time contracts than they have been in the habit of doing in the past year or more. Whether this feeling will be communicated to the trade in general can only be determined by time.

PIG IRON.—The local pig iron dealers are feeling quite a good deal more cheerful than they have been for the past several weeks, owing to the fact that buying has been a little better, and the foundries are calling for shipments on contracts a little more rapidly. The buying in the past week was not for any very large lots, the largest being 500 tons, of which size there were several lots sold, but the aggregate for the week is quite a little better than the week before, and the orders come from concerns that have not bought for some time, and are quite widely scattered. There are also several new inquiries for material, some of them of large size, and it appears likely that these will develop into orders within a short time. Prices are being firmly held to, despite the rumors current last week to the contrary. Southern iron hardly did as well as Northern last week, but there was a fair demand, and sales were of good volume. The largest single order was of 400 tons, but a good number of smaller ones, ranging from 250 tons down, were taken. Shipments are being taken about as fast as the furnaces can make them, and there is every indication that business is getting better slowly. Inquiries are being received for large lots, and the next week or two will probably show good sales. Lake Superior charcoal iron is quiet, with only a few small sales. Quotations on pig metal are unchanged, and are as follows:

Lake Sup. Charcoal	$13 00@13 50	Southern No. 2 Soft	$ 9 75@10 00
Local Coke Fdy. No. 1	10 25@10 50	South'n Silveries No. 1	11 50@11 75
Local Coke Fdy. No. 2	9 75@10 00	South'n Silveries No. 2	11 25@11 50
Local Coke Fdy. No. 3	9 40@ 9 65	Jackson Co. Silveries	15 00@16 00
Local Scotch Fdy. No. 1	10 25@10 50	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 2	9 75@10 00	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 3	9 50@ 9 75	Ohio Strong Softeners	12 50@13 00
South'n Coke No. 2	10 00@10 25	Alabama Car Wheel	17 50@18 00
South'n Coke No. 3	9 50@ 9 75	Malleable Bessemer	11 00@11 50
Southern No. 1 Soft	10 00@10 25	Coke Bessemer	11 00@11 50

BARS.—The market has been rather quiet, and only a small number of orders have been taken, none of them of any great size. Notwithstanding the quietness, some of the larger mills report a decidedly firmer tone as regards prices, and there seems to be a disposition on the part of at least one of the large Ohio mills to raise quotations a trifle. The nearby mills, however, do not share in this disposition, and as a consequence selling is being done at as low figures as have ruled for the past several weeks. Prices are made at 1c for common iron, 1.15c for guaranteed iron, and 1.20c for steel bars from strictly billet stock.

RAILS AND TRACK SUPPLIES.—None of the large orders expected for this month have materialized as yet, and the market is very quiet. Prices are as last reported. Rails, $23 to $25; splice bars, 1.25c to 1.30c; track bolts, 1.95c to 2c; spikes, 1.65c. to 1.70c.

BILLETS AND RODS.—The only item of interest is the starting of the Joliet billet mills on Monday of this week. Only a few small sales of either billets or rods were made, at unchanged prices. Billets, $16.50 to $17; rods, $23 to $23.50.

STRUCTURAL MATERIAL.—The Ellicott Square Building, to be erected at Buffalo, mentioned several weeks ago in this column, was taken last week by a Chicago contractor, and the order for the steel required, 5,000 tons, will be placed in Pittsburg this week. Aside from this, little business was done. Prices are as last quoted: Beams and channels, 1.45c to 1.50c; angles, 1.30c to 1.35c; plates, 1.35c to 1.40c; tees, 1.55c to 1.60c. Small lots from stock are quoted at ¼c to ½c higher.

PLATES.—One or two orders of considerable size were placed last week, but the general trade is quiet. Prices are no stronger, and are made as follows: Tank steel, 1.35c to 1.40c; flange steel, 1.50c to 1.75c; firebox steel, 2c to 5c; boiler tubes, 75 to 77½ per cent discount.

MERCHANT STEEL.—There is a rather better call for some classes of material, but general sales have not improved, and the outlook is not particularly encouraging. Quotations are made: Open-hearth spring, tire and machinery steel, 1.55c to 1.60c; smooth finished tire and machinery, 1.50c to 1.60c; Bessemer bars, 1.35c to 1.40c; tool steel, 5.50c to 7.00c; specials, 11c and upwards.

SHEETS.—Business in the past week has been considerably better than in the week before, and several long time contracts were closed. Orders for small lots were also more frequent, and altogether the situation is much better. The inquiry keeps up, and it is likely that a good business will be done for some time. Prices are about as last quoted, though they are rather weak. No. 27 common iron is quoted at 2.30c to 2.35c; steel sheets at 2.40 to 2.45c, and galvanized sheets, 75 and 10 per cent discount.

OLD RAILS AND WHEELS.—Almost no business has been done, and prices are unchanged. Old iron rails, $10.50 to $11 old steel rails, $7 to $9, according to length, condition, etc.; old wheels, $8.25 to $8.50.

SCRAP.—In the past week only a light business has been done, and there are no changes in prices. Railroad forge, $8.50 to $9; dealer's forge, $7; No. 1 mill, $6 50; No. 1 machinery, $7; axles, $12.25 to $12.50; cast borings, $3.50; wrought turnings, $5.25; axle turnings, $6.25; mixed steel, $5; heavy cast, $7 to $7.25; stove plates, $5 to $5.50; heavy melting steel, $7 to $7.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The large purchases of Bessemer pig in the past two weeks have strengthened that market materially, but the price has not been advanced to the extent indicated by the lowest and highest transactions. While some of the metal was taken at $9.60 valley furnace, there have been small sales, since the heavy buying, at $10.15, Pittsburg. It is reported that an inquiry has been made for 10,000 tons of Bessemer pig for shipment into the Cleveland district. The position of valley furnacemen has evidently been strengthened by the recent buying; and in view of the uncertainty about the price of coke after April 1 they are chary about making engagements on iron that will come from the furnaces after that time. The recent orders, it is reported, can be filled, so far as March and April deliveries are concerned, from stocks in valley furnace yards. The strike among the miners of the Pittsburg district makes the fuel question a prime element in all calculations for the near future and

the chances that last season's history may be repeated are being discussed, though the preponderance of opinion among the furnace interest is that a moderate advance in the price of coke is more likely than a strike. The early portion of the week showed a weak feeling as to billets, but transactions were few. The fact that Edgar Thomson will be on rails for most of the month is an element of strength and with inquiries up for two large lots the prospect is good for a firmer market. The latest transactions have shown a price range of $14.90 to $15.10. The situation as to structural material is unchanged. The competitition of the Cambria Iron Co., of Johnstown, on beams and channels will be an element from this time on. Quotations remain at 1.20c@1.25c on beams and channels up to 15 inches. The mills are well supplied with work for spring delivery. Plates are still quoted at 1.10c@1.20c for tank and local mills have several contracts for lake shipyards. Sheet mills are somewhat firmer in their ideas. Present quotations are 2.10c@2.15c for No. 27 common iron, with 5c additional for steel. Bars are more active, but with no quotable improvement in price, though cutting is less general. Scrap has been more active with a slight advance on rails. Sales of steel scrap aggregating 10,000 tons are reported in the past 10 days. Reports from the Connellsville region show that in the week ending Feb. 23 there were 14,445 ovens active, with estimated production of 154,289 tons, a gain of 2,279 tons over the preceding week. The operators are shipping about all their product, 8,381 cars going out in the week mentioned.

Boston. It is evident, from the number of calls for iron, for immediate delivery, that the foundry business is improving somewhat in this territory, again numerous contracts are, and more soon will be placed for cast iron water and gas pipe, which means the consumption of thousands of tons of pig iron, and as the bids are based upon the present price of pig iron, the pipe foundries will probably place their orders in the very near future, which ought to influence prices to some extent. Several of the large foundries in New England are in the market for large blocks of pig iron, and during this month we expect to see a very large amount sold. The general market is much firmer than it was a few weeks ago.

Cincinnati. The business of the week has evinced a better feeling and more confidence, though prices have not improved, except for Bessemer pig. Some large consumers, persuaded that now is a propitious time, have placed large orders for pig iron, covering their requirements as far into the future as sellers would go. The continued improvement in the earnings of the railroads contributes much encouragement, as their buying facilities are correspondingly augmented. The movement already started toward their fresh equipment with rails and rolling stock it is believed will be steadily increased as the season advances, causing greater activity among the car builders, rolling mills and numerous industries interested. The tool makers are experiencing a slight revival which unmistakably means an enlivening of general manufacturing. The general job foundry business exhibits modest signs of improvement.

Buffalo. Trade has jogged along at a comparatively slow rate during the week, with only a few transactions of any size consummated in this immediate district, so far as we are able to learn, although west and east of here several orders of more than ordinary size have been under negotiation. We make no change in quotations.

LAKE SUPERIOR IRON MINES.

Up to the close of last week, Secretary F. W. Denton, of the Lake Superior Mining Institute, had received notification from 50 members of the institute that they would attend the meeting of this week on the Mesabi and Vermilion ranges. The sessions for the reading of papers will be held at Virginia and Tower, Minn. The second circular of the secretary has the following: The following subjects will be brought to the attention of the Institute, by papers or otherwise: "The relations of the vein at the Central mine, Keweenaw County, Mich., to the Kearsarge conglomerate." Open pit mining and its advantages with special reference to the Mesabi deposits." "The geology of the Eastern Mesabi range." "Crushers for the hard ores of Lake Superior." "Pumping." Members are requested to bring any notes upon these subjects that may be at their disposal. It is desired to increase the discussion of papers at the meetings. Records of baling tests would be very appropriate. As much open pit mining was done in the early days in Michigan, some of the members may be able to give the difference in the cost of mining in open pits and underground.

The Commonwealth Mining Co. is one of the very few mining corporations that made any money last season, and that a divident of one dollar per share will probably soon be declared. The property never was in better shape to make money than now, was there a demand for ore. The company has about 120,000 tons of ore in stock on the surface, but has considerable broken and stocked underground, which will be hoisted as soon as the shipping season opens.—[Range Tribune, Iron Mountain, Mich.

Stories about Ferdinand Schlesinger's Mexican mining operations float through Upper Peninsula papers now and then. The latest is that his gold mine is netting him $110,000 a month. It is hard to understand why the extra $10,000 was tacked on in telling this.

The report is unfounded, that the Florence mine would resume at an early day.

Efforts are being made to sell or lease the Swanzy mine, a property of the Escanaba River Land & Iron Co.

At the Winthrop, preparations are making to get out considerable ore the coming season. As soon as the main shaft is extended to a greater depth and certain drifts are completed, hoisting will be commenced. There is quite a large amount of ore in sight, and at least 12,000 tons a month can be taken out. Work will be resumed also, in the open pit as soon as navigation opens.

The Fayal Iron Co., a sub-company of the Minnesota Iron Co., has let the contract for a shaft house that will be the largest, and, with the exception of that at the Auburn, the best appointed on the range. At the mine about 50 men are now at work underground developing, but a fine machinery plant has been ordered, and will be in before Summer.

The deal for the lease of the Mesabi Chief to the Penn Iron Co. has not yet been closed.

The Chapin and Pewabic mines at Iron Mountain now employ about 1,000 men, while the mines at Norway give employment to about 600, says the *Norway Current*, these in addition to the men at work in the woods.

Work was suspended at the Cleveland Hematite mine at Ishpeming last week, pending a discussion of wage matters between the men and F. P. Mills, agent of the company.

At the Adams property on the Mesabi, 100 men are employed at stripping with a steam shovel.

THE Ironton (O.) Rolling Mill of the Eagle Iron & Steel Co. has secured the contract for the bar iron required for 760 cars to be built by the Ensign Car Co., of Huntington, W. Va., for the Southern Pacific. The order calls for nearly 2,000 tons and will keep the mill busy for three months.

THE Poughkeepsie Electric Light & Power Co., of Poughkeepsie, N.Y., have placed the contract for their new plant with the Berlin Iron Bridge Co., of East Berlin, Conn. The engine and dynamo room will be 61 ft. wide and 172 ft. long, and the boiler room 77 ft. wide and 60 ft. long. The whole will be covered with the Berlin Iron Bridge Co.'s patent anti-condensation corrugated iron roofing.

THE IRON TRADE REVIEW

DEVOTED TO
IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.
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FOUNDRY COST SHEETS.

In the latter part of the interesting question meeting of the Western Foundrymen's Association at Chicago, two weeks ago, the Association came to one of the most important of the practical, every-day type of questions to which it has given prominence in its discussions. Methods of keeping foundry cost accounts may differ, but the necessity of knowing from day to day and from week to week what sort of record the cost sheet is making rests upon all concerns alike. Where but one class of work is turned out—stove plate, for example—the history of one week's operations may answer for many another, and the variations may be confined for the most part to differences in cost of mixture or in the scale of wages. Yet there is danger in taking too much for granted even in establishments whose work is so largely routine. If there were ever a time in which the small variations in cost called for scrutiny, it is today, when competitors are straining every nerve to attain the next notch lower. And the commoner the product, and the fewer the processes involved in its manufacture, the sharper the struggle to achieve the minimum in cost.

Probably no remark more frequently comes from the foundryman, who learns for the first time of a new cut in the price of castings on which he confidently believes he has attained the minimum, than one charging on his competitor ignorance of the cost of his product. Oftentimes this remark strikes close to the truth. There has been much occasion for it in the past year, when the effort to keep turning has led to a dangerous independence of the information given by cost sheets. A Western foundryman of long experience, who has been a close buyer of iron, always paying cash, declared recently that in all his years in the foundry he had never before been put in the position of going below what he knew to be cost. His conservative business sense rebelled, and after several months of unsatisfactory attempts to get orders permitting of even a small margin, he has announced his retirement. The statement of his recent experience is accompanied by the declaration that he is not willing now, after years of close application to the foundry, to continue in the business and give away the gains of other years. It is not to be taken for granted that this particular foundryman had left unstudied any of the economies possible to his competitors. He knew well the scale of wages paid by his competitors, owing to the pretty general unionizing of the molding trade, in addition to the special organizations among machinery molders and stove molders. It was not that he had disregarded costs or failed to figure them closely, but that others less particular on this score, were following the pace of some larger interests—of certain steel works, for example—in making "any price to get the order." One of the participants in the Chicago discussion doubtless spoke of what he had encountered, in the same way, when he said that "there are foundrymen who at the present time are making prices on their work which it is impossible to meet." Whether the policy be a deliberate one, pursued in the full knowledge that cost is being cut, or whether it be one to the inability of the maker to devise a system that will tell the story of his business day by day, the result in either case is only a matter of time. A western concern, which we now have in mind, can lay its assignment to the fact that its manager, though a competent engineer, had not been trained to make his foundry register its operations as they went along, and to make each job stand on its own base.

The subject is one of the most important that has come up in either of the foundrymen's associations, and it is hoped it may have thorough consideration. There is a way of comparing notes upon it, without giving away shop secrets, and we shall look to see the Western Foundrymen's Association handle it in a way that will elicit the largest fund of information consistent with proper secretiveness.

THE recent test of a Carnegie plate that had been forged down from 17 in. to 14 in. after the supercarbonizing of the surface, was brought out by the newspapers as a "new" and "revolutionary" process. Reheating a plate, then rolling it down and then chilling it in cooling with a spray of ice-water, with a view to reducing internal strains to the smallest point, besides toughening the plate, is a procedure employed by both the Pittsburg and Bethlehem Armor Plate Works nearly four years ago, at the instance of the Ordnance Bureau of the Navy Department. In the previous instance, however, the plates were reduced from 12½ in. to 10½ in., and then hardened by means of ice-water jets. The fact that no cracks were developed in the 14-inch plates lately tested, even though in one instance the projectile went through the plate, is proof of the advantage of rolling down after carbonizing. And while the treatment may not be new, it seems to have made an impression on the Ordnance Bureau experts that will lead to its more general employment, materially lightening vessel armor, without lessening its resisting power.

HENRY M. HOWE, of Boston, whose work on the "Metallurgy of Steel" is regarded as standard all over the world is the recipient of the Bessemer medal for 1895, the award having just been announced by the Iron and Steel Institute. Mr. Howe's important contributions to iron and metallurgy and to its literature have put the great interests which the Iron and Steel Institute and other like organizations represent under a great debt to him, and the formal recognition thus made of his services is deserved to the last degree. Mr. Howe is the fifth American to be thus honored. Peter Cooper, A. L. Holley, Abram S. Hewitt and John Fritz are the others. The visit of President E. Windsor Richards, of the Institute, to this country last year, to present the medal to Mr. Fritz is still remembered with pleasure by all who met him.

A COMPARISON of the blast furnace figures of Feb. 1, 1895, with the table for Feb. 1, 1890, when prices were on a summit, from which the chart-line has been trending downward ever since, brings out many interesting contrasts. Not the least significant of these relates to the anthracite furnaces of the East. The number carried on the efficient list in 1890 and the average capacity is strikingly at variance with the figures of today. The following figures are taken from the blast furnace reports of Feb. 1, 1890, and Feb. 1, 1895:

		In blast.	Weekly capacity, Tons.	Out of blast.	Weekly capacity, Tons.
Anthracite furnaces,	Feb. 1, 1890,	112	45,681	69	18,473
" "	Feb. 1, 1895,	33	20,317	97	39,984

The inference is that as a whole the East, where the furnaces are located that use anthracite or anthracite and coke as fuel, cannot meet the low prices now ruling. Certain favored furnaces in that section, notably those close to the Cornwall ore supply, can stay in the race, but there must be a considerable advance in the price of pig iron to permit any general furnace resumption in the East.

THAT there is a short interest at Pittsburg, whose wishes modify the quotations given out on the recent large transactions in Bessemer pig in that market, is one explanation that has been made of the way in which these purchases have been reported in certain quarters. The statement, for example, that the greater part of this iron was sold at $10.05 in addition to its own inaccuracy, ignores the fact that large sales were made at $10.15 and $10.20, Pittsburg, and that the last purchases in the total of 80,000 tons for one firm, were at $9.60 valley furnace, or $10.25 Pittsburg. After the two or three months of gloom in which valley furnacemen have struggled on, while some of them are reported to have made sales at $9.20 and $9.25, it is only right that the light should be let in, when there is any. The day may come, it has been intimated, when the great Bessemer pig iron producing interests centered in the two valleys will find a way to greater freedom from the domination of an interest that of late has been too plainly inimical to the seller.

MR. GAIUS S. MERWIN, of the firm of G. S. Merwin & Co., of Chicago, has been advised by his physicians that, owing to the state of his health, he must absolutely retire from active business for an indefinite time. Mr. Merwin, therefore, has arranged for Rogers, Brown & Co., of Cincinnati, through their Chicago agents, Messrs. Foote and Billingslea, to close up the affairs of G. S. Merwin & Co. Messrs. Foote and Billingslea have heretofore made their headquarters at the Masonic Temple, but in the future they will conduct the business of Rogers, Brown & Co., and attend to the closing of the affairs of G. S. Merwin & Co. at the offices of the latter concern, 1016 Monadnock Block, Chicago.

ROGERS, BROWN & CO., of Cincinnati, have recently begun pushing the sale of Mannie iron, made by the Southern Iron Co. at Mannie, Tenn. The claim is made that it is almost entirely free from the hardening elements—sulphur and combined carbon—which all irons have in a greater or less degree. Its silicon runs lower than in pure silvery irons, ranging in the neighborhood of four to five per cent, while its phosphorous is about 1.50 per cent. It is a very fluid iron, closely resembling Spathite, and is made with hard wood charcoal, which insures cleanness. In fact, Mannie iron is claimed to be one of the most perfect softeners ever put on the market.

CONTRACT for the iron roof for the new machine shop for the Hudson River Water Power & Paper Co., at Mechanicsville, N.Y., has been placed with the Berlin Iron Bridge Co., of East Berlin, Conn.

BETTER RAILROAD BUYING.

The volume of buying of late by railroads, for the rehabilitation of equipment, has had some encouragement in it. Commenting on recent contracts, the *National Car and Locomotive Builder* says: Those who have noticed the interesting items on the first page of our February and present issues must have observed a marked and gratifying increase in the number of items recording orders placed for new cars and locomotives. Our February issue recorded such orders aggregating over 1,800 freight cars and 20 locomotives, all for home roads. In addition to this, the same issue announced bids on about 5,000 more new freight cars. This issue records that contracts were made in accordance with a number of these bids, and 44 passenger cars, 58 locomotives and 7,205 freight cars have been ordered. The aggregate value, moderately estimated, of this large addition to the present equipment of our railroads, is over $4,400,000. Bids are now being considered for 46 locomotives, 29 passenger cars and over 6,000 freight cars, the aggregate prospective value of which is over $3,600,000. There is good reason to believe that orders for this and much more new equipment will be placed early in March. This assures a most gratifying increase in the many branches of manufacturing industry which contribute material that is used in one form or another in the manufacture of railroad rolling stock; and this means the re-employment of many hundreds of now idle workmen, the earnings of whom will enter nearly every imaginable channel of trade and stimulate countless industries.

The Pullman Palace Car Co. are thus quoted by a Chicago paper on the recent car buying and its significance: "There is no special improvement in trade. We are receiving a few orders all the time, but they are small ones. Passenger traffic is light and that naturally affects the business of the Pullman company. An order for 100 cars looks as large now as an order for 1,000 cars used to. There can be little improvement in the railroad business until a good crop is insured. In other lines of rolling stock, business is much better. The Illinois Central has recently given an order for 1,000 freight and 300 refrigerator cars; the Duluth and Iron Range for 400 ore cars; the St. Louis, Alton and Terre Haute for 125 furniture and box cars; the Southern railway for 350 ventilated fruit cars; the Missouri, Kansas and Texas for 2,000 freight cars. The New York Central has ordered 3,000 cars, half of which are to be built in Detroit. The works at Huntington, W. Va., are about to start up with 1,000 employes. The Boston and Albany has ordered twenty freight locomotives from Schenectady, and the Lehigh Valley has ordered twenty-five freight and five passenger locomotives from the Baldwin works."

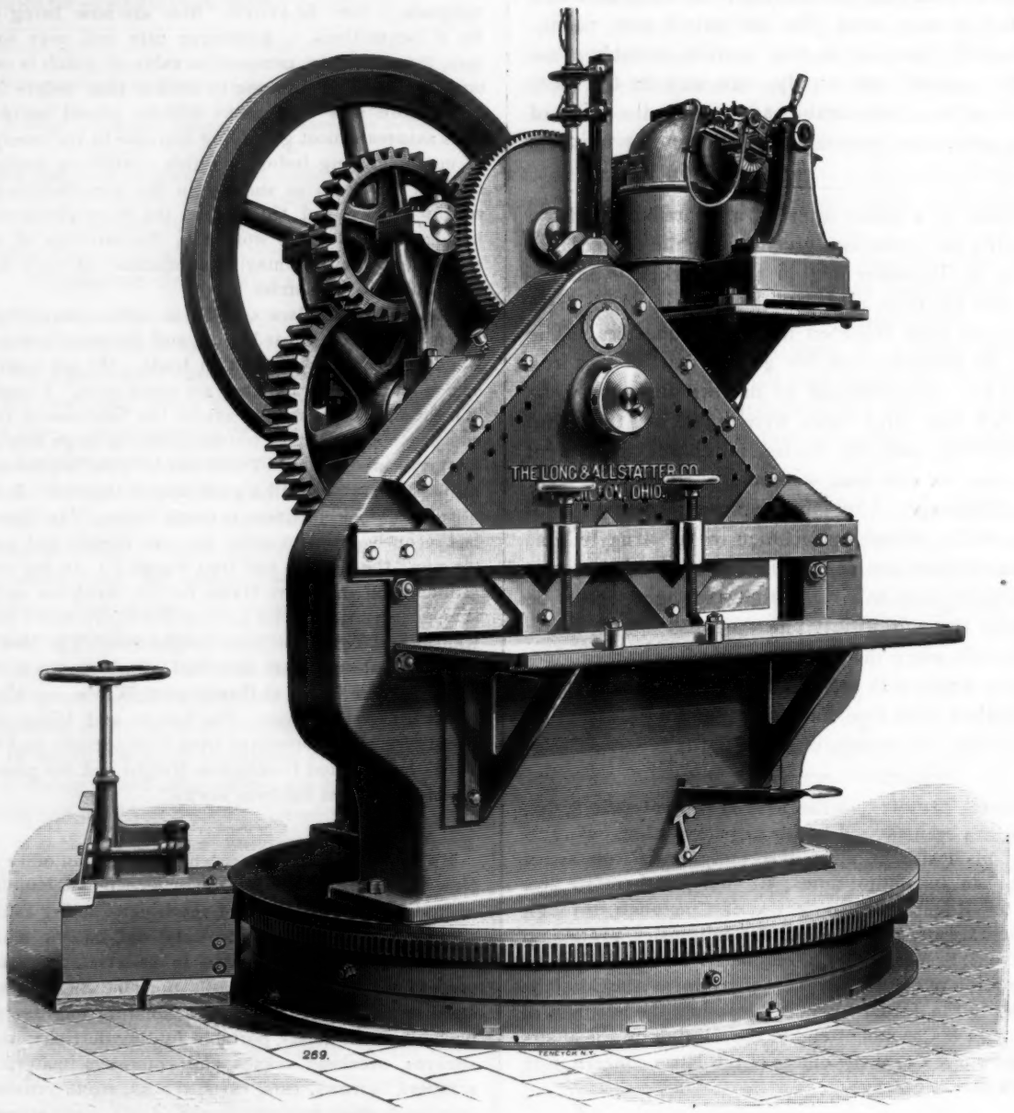
MR. WILLIS SHAW has recently opened an office at room 416 New York Life Bldg., Chicago, where he will handle a full line of contractors' supplies and machinery, acting as manufacturer's agent. He represents only well-known manufacturers whose products are reliable in material, workmanship and performance. He will handle portable engines and boilers, stationary engines and boilers, hoisting engines and boilers, portable chain hoists, portable folding derricks, wire rope and sheaves, overhead cranes and tramways, material elevators, scrapers, barrows, cars, carts, trucks, stone crushers, pumps, iron and steel roofing, forges, drills and other tools and machinery. Mr. Shaw has been in business in Chicago for a number of years, and has been connected with Fraser & Chalmers and the Crane Co. He has a wide acquaintance, and is a pushing, energetic young man, and will undoutedly make a success of his new business.

SEVENTY-FIVE cents from Lake Superior is still talked of as contract ore rate next season. This is a drop of five cents from 1894, but with promises of limited production, and the enormous increase in the ore carrying tonnage that will come out next season, vessel men seem inclined to close at that rate if good port dispatch can be secured. . . . . The large areas of ice to be seen on almost every lake are pleasing sights to the owners, who think that great fields of solid ice are the best binder for a late opening agreement that can be procured.—[Marine Record.

ELECTRICALLY DRIVEN ANGLE SHEAR.

The shearing machine shown in the illustration is built by the Long & Allstatter Co., of Hamilton, O., and is designed for cutting up angle iron. It is adapted to square cutting, or to cutting at mitres or other angles, either right or left hand. The machine shown is driven by an electric motor, but it is also made with a self-contained steam engine attached, making it in either case independent of line shafting, or it may be arranged with tight and loose pulleys for belt. The shear is operated by means of a steel cam shaft, and the shaft is so arranged that it may be turned by hand at the front of the machine, a great convenience in setting the shear blades.

The table of the machine is of iron and carries a gauge to be used in setting the bar square or at desired angles, and hold-down screws are arranged in front of the shear to prevent the bar tipping up as the knife comes down. An automatic stop



ELECTRICALLY DRIVEN ANGLE IRON SHEARING MACHINE.

movement brings the machine to rest when the shears are open, thus permitting the accurate adjustment of the bar to be cut.

This machine is mounted on a patent revolving table, so that it can be set accurately in a moment to the desired angle at which the bar is to be cut, without moving the bar from its normal position when being cut off at a right angle. The shear is also made with independent shafts and slides, or in any other form that is found desirable. The manufacturers build seven different sizes, the smallest being adapted for shearing angle bars up to 3″x3″x⅜″, while the largest is suited for shearing the heaviest angles.

THE Falcon Tin Plate & Sheet Co., Niles, O., has completed the addition to its works referred to in these columns some time ago.

METHODS OF PIPE BENDING.

Small iron pipes, up to one inch in diameter, may be bent cold and even coiled by winding them around a mandrel in a lathe, provided the diameter of the coil is at least nine or ten times the diameter of the pipe to be bent. Short bends in iron, brass, and lead pipes are apt to flatten at the bend. This is frequently prevented by filling the pipe with lead, which must be melted out after the bending has been completed. A set of "bending coils" can be easily made by any machinist for use when occasion demands. A separate coil is needed for each size of pipe to be operated upon. Steel wire is wound into a coil which will slide easily inside of the pipe to be bent. One end of the coil should be tapered to allow it to enter the pipe easily. The other end ought to be fitted with an eye turned in the end of the wire. Into this eye a cord or chain must be fastened, so that the coil may be pulled out of the pipe after bending. The pulling out of the coil does not require as much power, after the bending, as would be supposed, because the pulling of the coil lengthwise causes a decrease in diameter of the coil, which permits it to be drawn easily out of the bent pipe. Wire ⅛-inch in diameter should be used for a bending coil for a pipe one inch in diameter; for 1½ inch pipes, ¼ inch should be used.—[Machinery.

THE Lodge & Davis Machine Tool Co., of Cincinnati, report that their trade in tools is increasing, and that aside from their regular resident agents in England, France and Germany they now have experienced salesmen from the United States traveling in Russia, Turkey, South America and Mexico. They expect to ship soon two car loads of tools to New York, from whence they will be forwarded to England, France, Germany and South America.

BOILER STEEL REQUIREMENTS.

Every user of boiler plate knows that railroad managers use every scientific and practical method towards securing the best of materials for their locomotive boilers. To secure the best they necessarily have to pay high prices for the material. Experience has given them wisdom. They find it is better to use the best, notwithstanding its higher price, not only from the humanitarian point of view of preventing, as far as possible, loss of life and limb, but also from the point of economy in the end, in the less expense for actual repairs, and in the loss arising from the locomotive being out of use.

The vessel owner is just as intelligent as the railroad manager, but he has not had the opportunities of the latter to directly and frequently compare the differences in results, arising from the use of good, bad and indifferent material for his boilers. He keenly realizes that loss of life and limb and that delays and repairs are much more serious and disastrous on the water. It is plain therefore that no vessel owner would wish to economize on his boiler material alone, at the expense of quality.

Lacking technical or even practical knowledge to direct him in the choice of boiler material, he naturally believes that the Government marine boiler steel specifications afford him sure means of obtaining reliable material best suited for his purpose, in quality, strength and durability. The trustful vessel owner may be wofully deceived, for steel may fill all the United States marine tests and still not necessarily possess the important and desirable attributes we have just named. That this is true, will be readily realized by all those who will compare the meager and inadequate marine requirements, with the full and comprehensive specifications of any one of our principal railways.

To make this comparison clear, we have arranged in parallel columns what a leading Western railroad requires of the steel plate for its locomotives and by the side of each one of the railroad tests is a corresponding Government test :

BOILER AND FIRE BOX STEEL FOR RAILROADS.	STEEL FOR MARINE BOILERS, U. S. GOVERNMENT TESTS.
Surface Tests.	*Surface Tests.*
All plates must have a smooth surface, free from all sign or trace of lamination, crack, blister, pitting, ash, cinder, indented scale or burning; also free from bends, sets and buckling, signs of unequal contraction in cooling, or injury in forge manipulation, and must be of the exact thickness, and cut to the schedule sizes given in the requisition, with straight sides and right-angle corners, unless special instructions are given to the contrary. To be subject to the following tests :	None.
Physical Tests.	*Physical Tests.*
A test strip 24 inches long by 1½ inches wide should remain attached lengthwise to each sheet and be as perfect as the sheet itself. Sheets will not be accepted if the tests on said strips, without annealing, show a tensile strength less than 50,000 pounds, or greater than 56,000 pounds, per square inch, nor if the elongation falls below 28 per cent or is over 40 per cent on a length of four inches.	With the desired tensile strength (say 60,000 pounds for instance) there is demanded a reduction of area of 50 per cent and an elongation of 25 per cent in a section, the length of which is equal to eight times the thickness of the plate. In other words, an elongation of 25 per cent in two inches for ¼-inch plate; 25 per cent in three inches for ⅜ inch; 25 per cent in four inches for ½-inch plates; 25 per cent in eight inches for one inch plates, etc., etc.
Working Tests.	*Working Tests.*
The steel when hot, must stand the working necessary to make and flange the tube, head, dome, and throat sheets of a common locomotive boiler, without signs of cracking or fracture of any sort, also when cold, to stand without fracture or distress, bending over upon itself, and to be hammered together until the surfaces are in contact, thus making a piece of uniform thickness equal to twice that of the original sheet.	None.
Chemical Tests.	*Chemical Tests.*
A sample from each sheet will be subjected to a chemical analysis, and if the properties and impurities are found to exceed the allowed maximum, as given below, such sheet will not be accepted. Carbon..... .15 to .20 per cent. Phosphorus .03 to .04 per cent. Manganese. .35 to .50 per cent. Silicon ..... .025 to .04 per cent. Sulphur..... .02 to .04 per cent. Copper. ..... .025 to .04 per cent. Should any sheets develop defects in working, they will be rejected. Each plate must be stamped with maker's name and guaranteed tensile strength and elongation as above.	None.

Mark the definiteness, sufficiency and efficacy of the one set of tests, and the lamentable lack of these qualifications in the other. The first will only admit a high grade of material, while the other admits almost any workable steel plate, from a poor quality to the highest, and does not distinguish between them.

In the above comparison we might have presented railroad specifications much more severe in their working and chemical tests. Some even insert an additional qualification, namely, that the steel shall have been made by the acid open-hearth process. Basic steel is a comparatively new product. Many of our leading boiler makers, engineers and railroad managers, who have had opportunities of comparison do not allow it to be used in locomotive, marine and other boilers involving much shop work. The basic process is complicated and uncertain in its results. No doubt in time the process will be simplified and in consequence the product will become more reliable. It matters not what may be the opinion and judgment of the Government inspector relating to the boiler plate, he must pass it if the metal has withstood the physical tests required.

Tank steel made by either the acid or basic-Bessemer processes or by the acid or basic open-hearth processes meets the United States requirements for marine boilers, as we have shown by tests in earlier numbers of the *Boiler Maker*. Just how near this grade is being furnished, recent buyers of marine steel plate need not be told by us. Possibly no better grade of steel is needed for the boilers than for the plates or beams of the hulls of our boats. If so, it is a matter of congratulation that the difference in price is so slight as to permit the easy placing of hull steel in the boilers or vice versa.

As a matter of fact we will state that the specifications for the hull plates (60,000 lbs. tensile strength and 25 per cent elongation in eight inches) of the Government cruisers require a much higher grade of steel than may be admitted under the United States marine boiler laws. The present practice and laws which allow the use of the cheapest grade of steel in marine boilers, seems almost criminal, and the evil of it will some day be made apparent by some great catastrophe.

Better no law at all than the present law. If it were wiped off the statute books, vessel owners and builders would, having no Government laws to rely on, at once investigate the subject and educate themselves, as the railroad men have, to the point of requiring the best material. There would then be no more cheap steel in our marine boilers.

Some makers of boiler plate decline to furnish their cheapest grades of steel for marine boilers, even though it is certain such steel would satisfy all the Government requirements. Further, some of our best informed boiler makers, knowing that the marine laws do not discriminate between good and inferior steels, require as a criterion of merit, that the steel shall be of a brand or make of established character before beginning work.

If these steel manufacturers or boiler makers had permitted the use of an inferior metal, knowing a better grade should have been used, and a failure should result, they both would feel that they deserved the condemnation of the public. The public should be protected by better marine boiler laws. As we have said, the present law is worse than no law at all. Its predecessor was bad, but the present is worse. It is decidedly behind the times, and should be made to conform with the modern practice and experience as best set forth by the specifications of our leading railways. There is no manufacturer but would welcome such a change in the law as would compel the use of the highest grades of material that can be made, even if surrounded by what might seem most annoying details of inspection.—[Boiler Maker.

THE catalogue just issued by the Winslow Bros. Co., o Chicago—photographic edition—contains 165 pages, is printed on fine paper and is durably bound in cloth. There are 298 half-tone and 87 etched illustrations of ornamental iron and art metal work and views of 14 of the prominent buildings in which the ornamental iron work of the publishers is placed. Thirty pages are devoted to galvanoplastic productions in bronze, mostly selections from the Winslow collection. The book is a thoroughly artistic one and the contents give a new idea of the extent to which the blacksmith's art has advanced. in the ornamentation of modern buildings. Copies of the work will be sent to architects on request and to any address on receipt of 50 cents.

STEEL vs. GREY IRON CASTINGS.

In the March *Engineering Magazine*, Horace L. Arnold has an interesting article on "The Conquest of Steel over Cast Iron." He opens with the statement that "the constant improvements in steel manufacture and our vast natural resources in the way of ore and coal, coupled with the eager competition of steel makers in search of a market for their product, have brought the price of wrought steel in the form of superbly-finished round bars and plates to such a point as to give the manufacturer of small metal wares a new constructive material." In the discussion of his subject he deals largely with the line of manufactures sold to builders, house finishers and housekeepers. Among the articles he has selected for illustration are a caster for use under furniture, a hame fastener, a drive chain, a whiffletree plate, parts of a cash register, and parts of a coin-controlled vending machine—all made from sheet steel and stamped out instead of from cast iron. We extract from the article as follows:

There can be no question as to the superiority of our small grey-iron castings. We have perfected the art until the every-day output of some of our foundries has as fine a skin and is as perfect in minute details of outline and ornament as the German cast-iron jewelry so long celebrated as the finest example of the molder's product. At the North Cromwell Conn., foundry, the work reaches such a close approximation to perfection in the points of uniformity of size, smoothness of surface, perfection of outline to the entire exclusion of fins and sprue marks, and uniform texture of metal, as to fill every requirement in the way of assembling and finishing the extremely ingenious toys. The North Cromwell foundry ships such wheels as are put under the familiar tin toys to the German and French toymakers. These wheels are marvels of delicate casting, from a hundred to a hundred and fifty wheels to the pound according to the size, with a hole drilled accurately in the center of each wheel. These were sold in the times of our highest prices at 11 cents a pound. All of this work is hand-moulded, and one boy will put up a hundred or a hundred and twenty snap flasks for a day's work, each containing twelve mop head parts with a large core in every piece, at a wage of 75 cents or $1.00 for the moulding of the entire twelve or fourteen hundred pieces. With such a low labor cost and such perfection of product, it is not a matter of surprise that manufacturers of small articles should naturally turn to castings as the cheapest and best material for the basis of their product.

In the important class of locks and hinges our grey-iron castings revolutionized the methods of manufacture, and overcame the prejudices in the minds of users against the fragile material, grey iron, as compared with the wrought-metal structures previously in exclusive use. We are yet the producers of enormous quantities of cast-iron door-locks, the factories at New Britain, New Haven, and South Norwalk employing thousands of hands in fine factories in the production of really excellent locks. The English and German lock-makers made the lock-case and bolts of wrought metal, and used a cast-metal key, while we cast the case and bolts, and in a very large class of work even the lock-tumblers as well, but use a wrought-metal key, a flat steel key, which we first inserted in a cut in a barrel forming part of the lock to make it turn smoothly and easily, but later built up around the bit to secure a good turning action.

We made grey-iron castings much stronger, weight for for weight, than had ever before been commercially known. To such perfection was the art of mixing and melting iron brought that our small grey-iron castings would bend a long way before breaking, and at the same time have great stiffness and elasticity; so that we really make good durable work with our cast-iron substitute for wrought metal, which was, until quite recently, the final resort where the lowest cost of production must be had.

We have now, however, reached a market price for sheet steel, cut in strips to suit the purchaser's needs and rolled very accurately to thickness, which threatens the supremacy of grey-iron as the chief factor in low-cost production of small manufacturers. The utmost efforts of the foundryman fail to bring the price of fine castings to 2¼ cents per pound. Indeed, it requires extreme care in every detail to bring the first cost of fine castings, such as are used in locks, casters, and house trimmings, much below 2½ cents per pound. Although patterns are made and gated with the utmost skill, and used in connection with snaps and matches of incredible convenience and perfection, so that the patterns "jump out of the sand themselves," as molders express their easy and perfect leaving of the flask, there are still large and unavoidable expenses attending the production and use of small grey-iron castings. In spite of the best efforts of the melter, there is a considerable percentage of loss of stock in the cupola; no matter how diligently the riddle is used, there is another small loss on the floor; and, though the sand is so fine and the skin of the casting so perfect that the work comes almost clean when shaken out, it must all be handled over the wheel and through the tumbler. Patterns are expensive, and must be kept up; oil matches require some attention; and there is a far higher grade of handicraft skill required of the molder than of the rolling-mill hand and press feeder. All of these small factors unite to prevent the reduction of the cost of small grey-iron castings much below that obtained with present methods, so that, with sheet steel at 2¼ cents per pound, and our present skill in die-making and the very great excellence of our presses, it is doubtful if any small wares can be made more cheaply in grey-iron than in steel.

At first sight this proposition seems absurd. Grey-iron lends itself so readily, through its fluid condition, to the acquirement of any desired shape that the mind at once turns to that material when an article of complex figure is presented for construction. A ladleful of melted iron fills the intricacies of a properly-prepared mold with no greater power requirement than is furnished by ever-present gravity, and demands no greater resistance to confine it during the forming of its contour than is afforded by the loosely-cohering sand of the mold; sheet steel, on the contrary, offers very great resistance to changes of form, and the shaping of it requires powerful machines with tools and forms of tempered steel to give and resist the effects needed to force this stubborn material into the thousand various complicated shapes demanded by small metal wares for general use.

In many cases, however, there is not much in cost of plant in favor of the casting. The patterns may cost, for the grey-iron work, as much as, or even more than the punch and die work for the same piece in sheet steel; and, from this point of first cost of plant, the cost is all in favor of the sheet steel, because the mold for the gray-iron work must be made anew for each individual piece produced, while tens and hundreds of thousands of pieces may be produced in sheet steel from one set of dies. Again, the very cheapest labor can be used to advantage in punch and die operations, while the grey-iron molder, even on the simplest work, must be skilled and must exercise his skill, and, while the moulder may produce in extreme cases, say, 150 "snaps" per day, each containing possibly 50 or 75 pieces, making a total of from 7,000 to 10,000 pieces per day as his extreme production, the press hand may make as high as 150 operations per minute, which would give an extreme result of 90,000 pieces in a day once through the press; and, where large quantities are produced, automatic feeds are substituted for hand feeding of the presses, so that in the cutting rooms, for instance, of some of the Waterbury brass mills one man and a boy keep a large number of presses in constant operation, at an expense so small as to be hardly appreciable for each piece cut. Nor need these press operations be simple in their results.

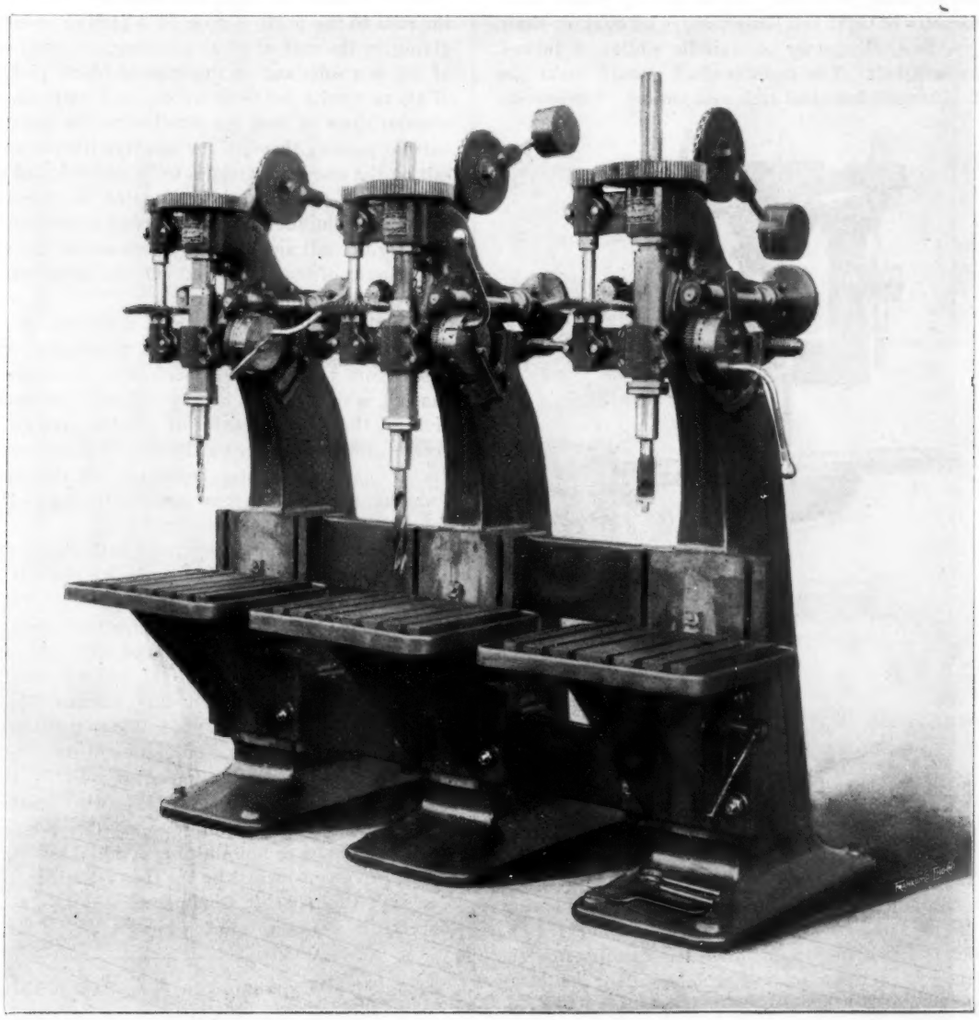
Hitherto mention has been made only of the press or punching machines as a factor in wrought-metal shaping, but within the last few years the header has had its blows increased from one to two or three in a cycle, and cold forging by means of light quick blows has been brought to a point of perfection which gives it unlimited powers in seemingly widely differing directions. To these may be added the riveting machines for cold work, also operating on the general plan of very light quick blows, which move steel in any direction and to any extent without hardening the metal; indeed, the effect of the cold forging seems to be to anneal the stock, so that tool steel drawn out in the cold forging machine may be tied in knots drawn up close without a sign of fracture.

With these aids at hand, and with perfect stock of any width and thickness,—or, if round, of any length and diameter,—the supremacy of grey-iron for small manufactures is not only threatened, but has already been attacked and overthrown.

MULTIPLE SPINDLE DRILL PRESS.

The accompanying illustration shows a new heavy multiple spindle drill press which can be used advantageously on a large variety of work, but is designed more particularly for drilling, counterboring and reaming bicycle parts. For this work it is in use in a number of leading bicycle shops. As will be seen from the cut, which illustrates a three-spindle machine, it is built up of three separate and distinct machines, the frames being securely fastened together by means of connecting brackets. Any number of spindles can thus be yoked together. The spindles are of steel and are two inches in diameter. They are counterbalanced by means of the adjustable weights shown at the top of the frames. A ball bearing is interposed between the lower end of the sleeve and the collar on the spindle, thus reducing friction to a minimum.

The feed is automatic and an automatic stop is provided for each spindle. The tables are of the bracket form and are very massive. They have an upright bearing on main frame 19 inches long by 16 in width, and are moved vertically to any desired position by means of a lever operating a shaft with a pinion which engages with a rack on face of main frame. A ratchet and pawl lock the pinion shaft so the table cannot fall.



MULTIPLE SPINDLE DRILL PRESS.

The vertical slots in which the heads of the four binding bolts travel are planed, insuring an accurate fit of the bolt heads and allowing them to travel easily up and down. This machine will easily drill holes in solid steel two inches in diameter, and it has been found that a very rapid feed can be maintained.

The greatest distance from lower end of spindle to table is 22 inches. The spindle has a vertical adjustment of eight inches, and the table 10 inches. The table is 20 inches long by 17 inches wide inside the oil groove. The weight of a three-spindle machine is 5,000 pounds.

The machine is built by Baker Bros., Toledo, O., and was designed by their superintendent, L. H. Colburn.

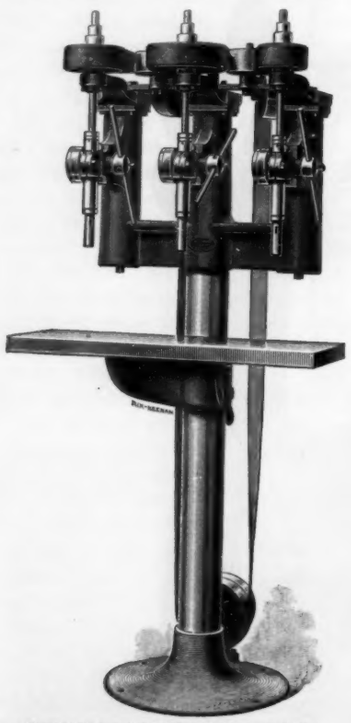
COMPRESSED AIR IN RAILROAD SHOPS.

Reference was made in these columns some time ago to the numerous employments of compressed air in the engine works of the Russell Co., at Massillon, O. Quite as much prominence is given to compressed air in the shops of the Atchison, Topeka & Santa Fe road at Topeka, Kan. The use of such pneumatic apparatus as riveting machines is by no means new, and pneumatic hoisting apparatus is employed in many shops. But the striking feature of the appliances in Topeka is their novel design, even the compressor being a home-made affair. A 16x42 inch Corliss engine in the shops was furnishing but part of its rated power, so the back head of the cylinder was removed, the piston rod extended and an air cylinder added, so that the steam and air cylinders were tandem, the two pistons being on the same rod. The compressed air obtained in this way is piped through the shops in three inch mains into receivers located near the larger machines. One of the most interesting of these is employed for cutting off stay-bolts. There are from 700 to 800 of these bolts in a locomotive boiler, and the usual method of cutting them off was with the cold chisel and hammer. The pneumatic cutter has two jaws, which are placed about the end of the bolt, and then forced together by the compressed air, cutting off the rod so rapidly that 1,200 bolts can be decapitated in an hour. Another interesting machine is a girder riveter, the novel point about it being the use of two pistons in the same cylinder. If the compressed air is admitted behind but one of these pistons the pressure exerted by the riveter is only about 25 tons, but if the air is admitted behind both pistons this pressure is doubled. The drilling is done by means of a rotary motor, much like some of the water motors now in use, which develops about two and one-half horse power each.

THE annealing department of the Johnson sheet mill at New Castle, Pa., burned March 2. It will be rebuilt.

THREE-SPINDLE PRESS DRILL.

Prominent among the features of this drill is the counter-shaft, independent of and belting to the base of the drill, thereby removing any jar or shaking that might be caused by unevenness in the belt. This system of belting imparts a perfectly steady motion to the spindle, and the belts being long, give great power while running quite loose. The tension of the belt is never on the spindle. The table can be brought to an exact position by the screw shown in the cut. This screw is No. 3, double thread, and gives a rapid motion to the table. This method of changing the table is regarded preferable to a counter-weight. The table is free to swing either way. A bell center is provided with each machine for center drilling and reaming. Either round or square table can be furnished, also round or square base. The capacity and dimensions are as follows: will drill ⅝ hole to the center of a 13-inch circle, 4½ inches deep without moving the table. Greatest distance from spindle to table, 36 inches. Table is 11¾ inches in diameter. Diameter of tight and loose pulleys on counter-shaft, 8 inches; 2½ face. Diameter of spindle pulley, 8 inches. Cones take 2-inch belt. The counter-shaft should make 300 revolutions. The quill has steel rack and pinion. The spindle



THREE-SPINDLE PRESS DRILL.

is made of the best crucible steel, and is reamed with Morse taper, No. 1. Spindle is counter-balanced with a coiled spring, which can be adjusted to any degree of sensitiveness. The column, which is 4½ inches in diameter, has a center line the entire length, and a pointer on the table arm will bring the center of the table exactly under center of spindle. The working parts of the 3-spindle drill are the same as on the one spindle. This drill has three separate heads 10 inches apart. The three spindles are driven by one endless belt, ample means being provided to take up the slack without cutting the belt. The size of the spindle pulleys are 8 in., 6 in. and 4½ in. diameter, giving nine different speeds in all.

The two outer spindles will drill to the center of a 22-inch circle; the middle one will drill to the center of a 13-in. circle. The table is counter-balanced by a weight inside of the column. These machines are offered by the Manufacturers' Tool Supply Co., 17 S. Canal street, Chicago.

SUPERINTENDENT JAMES GAYLEY, of the Edgar Thomson Steel Works, Braddock, Pa., goes to the Carnegie Steel Co.'s general offices at Pittsburg, to be assistant to H. M. Curry. He will be succeeded at Braddock by Thomas Morrison, now general manager of the Duquesne plant, who in turn will be succeeded by H. B. Miller, now master mechanic at Duquesne.

NEW PROCESS OF PICKLING METALS.

It has been demonstrated recently that electricity can be employed, and successfully, for the cleaning of metals. For some years previous this had been attempted by chemists and electricians, but the difficulties in the resistance in the solutions to the current and the unevenness of action on the substances to be pickled, rendered their efforts abortive. A Scotch chemist, Dr. A. S. Ramage, of Edinburgh, who has devoted years to this subject, has succeeded in demonstrating on a large scale in one of the large wire mills of this country, that he has overcome all the technical difficulties and reduced the process to practical results.

The process consists of making the articles to be pickled the anode or positive pole during the electrolysis of a solution of a salt of iron. In the case of pickling rods for wire drawing, the rods were immersed in a solution (contained in a vat made of wood and having around its sides in the solution a thin cylindrical sheet of iron) and attached by the hooks holding the rods to the positive pole of a plating dynamo, capable of giving, in the case of white pickling, a current with a pressure of 1½ to 2 volts and in the case of black pickling a pressure of 4½ to 5 volts between anode and cathode, while the thin circular sheet of iron was attached to the negative pole. The current passing through the solution liberates the acid of the salt on the anode, or articles to be pickled, and the iron on the negative, so that the acid liberated on the rods which immediately combined with the surface scale and iron, forming the original salt again, which dissolved in the solution while the amount of iron dissolved off the rods was deposited on the negative cylindrical plate.

A small dynamo of eight h. p. did a ton of rods per hour consecutively, cleaning them so thoroughly that they drew down from 5 to 15 grade perfectly. The wire was then galvanized, which operation was entirely successful. In black pickling the current used is of greater voltage than in white, because the scale covering the rods or plates being a poor conductor, causes a greater resistance to the current. As the scale dissolves, the current passes through with diminished voltage.

The process has also been tried with plates for tinning and arrangements are now being made to place it in some of the largest tin plate works in the country. The plates were pickled half a ton at a time, and perfectly done, and then tinned.

Those who have had experience with the steam and acid fumes always present in the old process, can appreciate the relief to the men afforded by this method, while its saving of nearly all the acid used at present is of great practical account. The saving in acid in one mill alone in the East will be $1,800 a week. From a sanitary point of view, it is a step in the right direction, as it does away with the death-dealing fumes and also with all the waste liquors. There is nothing to run down the drains to pollute rivers and lakes.

The process is owned by the Inter-National Metal Pickling Co., 1113 Chamber of Commerce, Chicago, who have introduced it in a wire mill near Chicago.

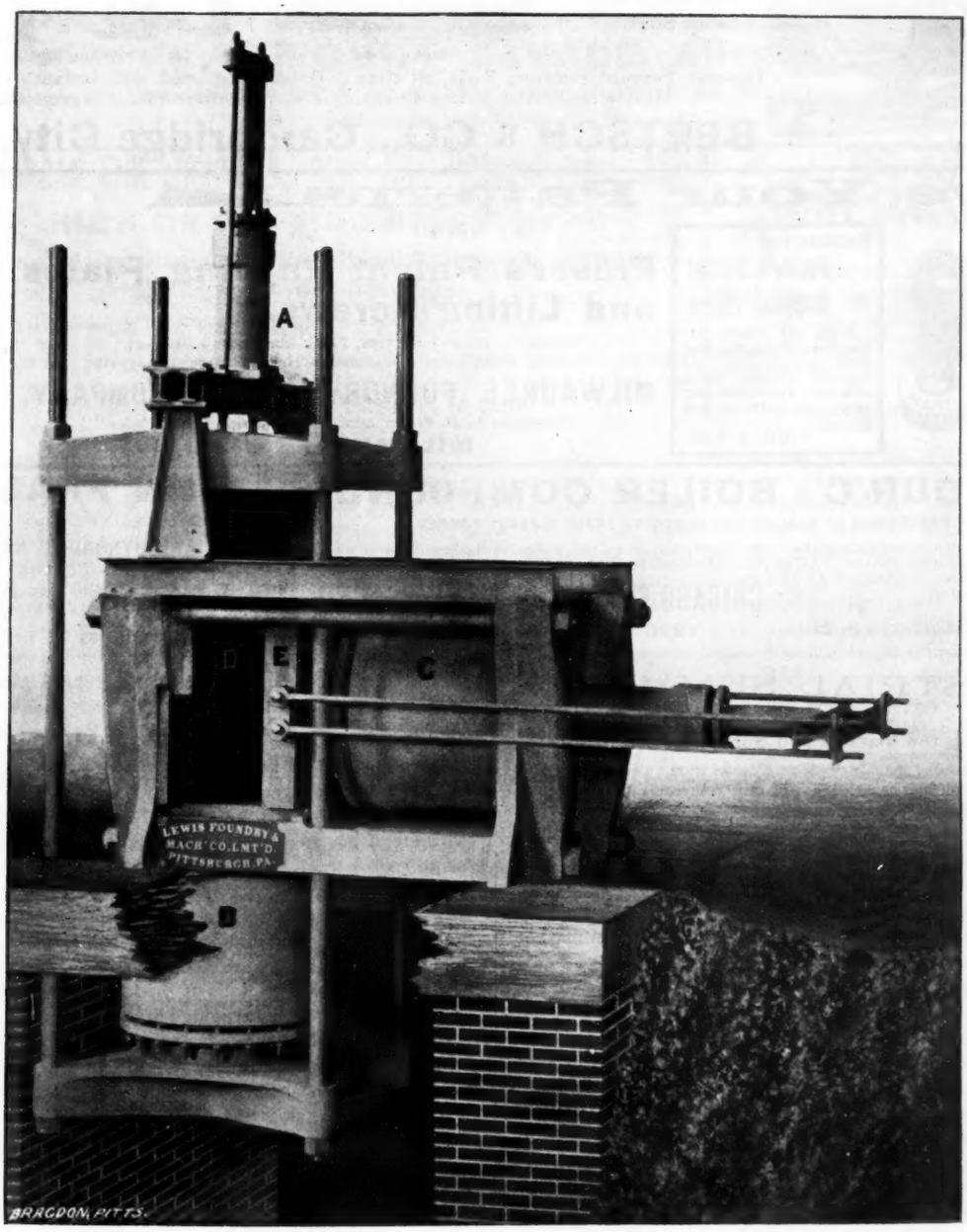
Steel Expansion in Fire-Proof Buildings.

The attention of architects and builders has been directed for some time to the difficult task of constructing an absolutely fire-proof building. It has been found, says the *Scientific American*, that a rise in temperature to 300 deg. Fah. will throw the heaviest steel columns more or less out of place, and that a rise to 500 deg. Fah. would ruin the best steel construction.

Fire-proof buildings are usually constructed, therefore, by surrounding the girders with material to protect them from the heat. An elaborate form of such a construction has been introduced recently in the new Tremont Temple, in Boston. It consists in placing about the great steel girders terra cotta blocks on all the exposed sides and strapping them together with iron. Upon this is stretched expanded metal lathing covered with a heavy coat of Windsor cement. Over this, in turn, comes iron furring, and this is provided also with a layer of expanded metal lath. The finishing plaster is laid on top of this last layer. It will be seen that this arrangement provides first a dead air space, next a layer of terra cotta, a Windsor cement covering, then a second air space, and finally a second thick layer of Windsor cement.

WILLIAMS HYDRAULIC SQUEEZER.

In the reworking of scrap iron into finished product, satisfactory service has been given by the hydraulic squeezer of which a cut is given herewith. It was designed by S. T. Williams, M. E., and is manufactured by the Lewis Foundry & Machine Co., of Pittsburg. The scrap material is either piled on board bottoms or made into fagots, each weighing, say, 150 to 300 pounds. These are first heated to a proper welding heat, then subjected to the hydraulic squeezer, which reduces them to a bloom or billet of 4x4 inches. From the squeezer they are taken to a heating furnace where a "wash heat" is given them, thence to the roll train and finished.



WILLIAMS HYDRAULIC SQUEEZER.

The opening for the heated scrap lump or fagot to be placed in the machine is plainly shown, and when so placed the horizontal plunger, E, working in the cylinder, C, moves forward until the mass is compressed to a thickness of four inches, when the vertical plunger, D, operated by the lower cylinder, B, descends, and thus the 4x4 billet or bloom is formed. Cylinder A, on the top, furnishes the power to raise the vertical plunger; cylinders C and B are the sqeezing cylinders.

Limestone Costs In the Valley.

The question has been discussed of late as to the relative cost of Lake Erie limestone and that with which the Mahoning Valley furnaces are supplied. A statement in a daily paper intimating that valley furnaces were at a disadvantage on the item of fluxing cost as compared with those on the lake shore, led secretary Chas. M. Crook, of the Bessemer Limestone Co., of Youngstown, to say: "There are practically inexhaustible fields of limestone within ten miles of Youngstown, which have been quarried from for the last forty or fifty years and the furnaces of this vicinity are supplied with stone on cars at the furnace for not over seventy-five or eighty cents per gross ton. This stone being higher in carbonate of lime than stone from the lake regions, is preferable to lake stone for fluxing purposes. This is shown by the fact that the Cleveland market is debatable ground between the two fields.

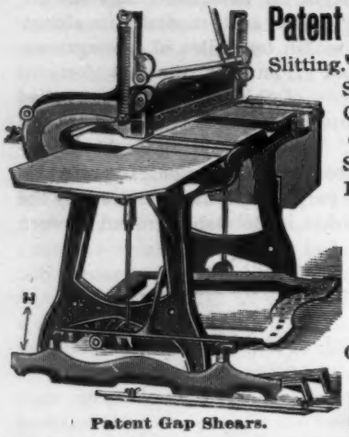
Heavy and Light Work Literature.

TO THE EDITOR OF THE IRON TRADE REVIEW:

Mr. J. W. Dearsley in your last issue, somewhat scores past writers for not treating light work to a greater degree. He makes some very good suggestions for topics. As he has shown ability to classify subjects, what is the matter with his trying his hand at writing them up? There certainly is an opportunity in this line for original work and if he should make his articles of value, he will find the heavy fellows very responsive to an appreciation of his labors. THOS. D. WEST.

The Ellwood City, Pa., Steel Tube & Casting Co., are running their works to their full capacity day and night and are turning out a large amount of finished product.

Machines for Working Sheet Metal.



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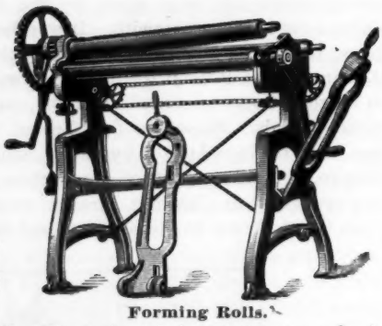

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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

H. L. & Co., 778 Elston ave., Chicago, want an 80 h. p. slide valve or Corliss engine.

B. F. Stockdon & Bro., Staunton, Va., will buy a riveting machine for boiler work.

The Elyria Gas & Water Co., Elyria, O., are in the market for 1,000 feet of 4-inch cast iron main pipe.

Rittenhouse & Embree Co., 35th St., Chicago, are in the market for a second-hand 500 h. p. engine, in good condition.

Rittenhouse & Embree Co., 35th street, Chicago, want to buy a second-hand belt in good condition, 48 inches wide, and about 140 feet long.

Arrangements have been completed for the establishment of pump works at New Brighton, Pa., by Glenn Bros., in the plant formerly operated by the Robinson Mfg. Co.

The McLagon Foundry Co., of New Haven, Conn., is in the market for machine tools and general equipment for its new machine shop, which will be erected in the near future.

A. W. Hawkins, chief engineer North Neck R. R. Co., Richmond, Va., will receive proposals for the construction of a steel bridge 750 feet long, with two tracks of standard gauge, and also for girder plate bridges.

Chas. P. Parish & Co., 203 E. Jackson St., Chicago, want to purchase a Pringle & Brodie automatic gauge lathe, adjustable head, self feed, with molding attachment preferred; also a good band saw, 36-inch wheel.

The Onondaga Dynamo Co. has been incorporated at Syracuse, N.Y., to manufacture dynamos, electrical machinery and tools, with a capital stock of $25,000, by Ella H. Eager, James W. Eager, and David Cronin.

The Christopher Double Power Engine Co. has been organized at Spartanburg, S. C., by W. D. Fowler, W. M. Bornar and J. H. Christopher, for the manufacture of an engine patented by Mr. Christopher. Machinery has been purchased, and a foundry and machine shop will be built.

New Construction:—

The McLagon Foundry Co., New Haven, Conn., will erect a new machine shop 100x40 feet, four floors.

The Pierce-Crouch Engine Co., of New Brighton, Pa., manufacturers of gas engines, will erect a new foundry in the near future.

The Hill Machine Co., Anderson, Ind., will make an addition to its machine shop 118 feet long by 36 feet wide, fireproof, built entirely of brick and iron.

The Stanley Rule & Level Co., Stanley, Conn., will erect a new boiler house, with walls of brick, floors of iron, and roof of iron, covered with corrugated iron.

Davis & Cowgill, who now operate a foundry at Omaha, Neb., will erect a new foundry at South Omaha, to cost $20,000. A building site has been given them as a bonus.

Greenville, Pa., is trying to locate a steel mill within its limits. The town is willing to pay a bonus of $100,000, and furnish a site, besides taking a $100,000 worth of first mortgage bonds in the company.

The plant under erection by the Crucible Steel Casting Co., of Canton, O., is nearly completed, and will be ready for occupancy within a short time. The concern will engage in the manufacture of crucible steel castings.

The plant of the Crescent Sheet and Tin Plate Co., Cleveland, is approaching completion and some of the machinery has been received. A start will be made about April 15. Black plates will be made at first. The tinning process will be taken up soon after, probably early in the summer. The mill will cost, when complete, upwards of $150,000 and will have a capacity of 7,000 tons per year. The hot mill will be 175x75 feet, and will be all steel. It will contain two engines, 34x72. There will be a 10-ton electric crane and other machinery, including a powerful dynamo. The tin house will be of steel construction 105x168 feet, with a wing 48x48 feet. The tin house will be provided with ten tinning stacks. The annealing house, with its pickling machines and other equipment, will adjoin it.

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A Baltimore dispatch refers to two tangible tin plate projects and adds that a tin plate plant is also contemplated at Curtis Bay, a rolling mill being already erected there. The dispatch says of the Baltimore enterprises: Norton Bros., of Chicago, have bought the site of the old Abbott Rolling Mills, and will erect buildings which will cost over $150,000, investing nearly as much more capital in the machinery. The Stickney Iron Co., of which George H. Stickney is president, is also preparing to build a tin plate mill, to be operated in connection with its iron works at Canton, near Baltimore. The company will build an entirely new plant, work on which will soon begin. Orders for a 1,000 horse-power Corliss engine and boilers for the new works have already been placed with the Maryland Steel Co. at Sparrow's Point.

Additions, Enlargements, Removals, Etc.:—

The Gem City Foundry Co., Quincy, I l., is making preparations to erect an addition to its foundry.

Union Car Works, Depew, N. Y., is adding to one of its machine shops, the addition being 126x360 feet, giving the build ing a total length of 700 feet.

The Missouri Furnace Co., St. Louis, Mo., is raising its furnaces 20 feet and increasing its capacity to 200 tons per day. Operations will be resumed within 60 days.

The James R. Reid Foundry & Machine Shop and the Elmira Oxide Paint Co., of Elmira, N. Y., have been transferred to a new corporation to be known as the Elmira Machine & Foundry Co. The officers will be, Henry C. Silsbee, president; W. H. Steiger, manager; Charles Roe, treasurer; C. W. Ufford, secretary. With James R. Reid the officers will constitute the board of directors. The present plant will be removed to a site on the Industrial grounds, near the railroad, and contracts for the construction of a new plant will be let as soon as the plans are completed. The main building will be of brick, 145x120 feet, and will be used as a foundry and machine shop. Particular attention will be paid to the manufacture of supplies for electric railroads.

Fires and Accidents:—

Wm. A. Nye's foundry at Bourndale, Mass., was destroyed by fire.

The foundry plant of Andrew Terry & Son, at Terryville, Conn., was destroyed by fire recently, causing a loss of $18,000.

The pipe works of J. B. Clow & Son at New Philadelphia, burned Feb. 28, with $100,000 loss. The insurance is $24,000. Fire started in the paint shop and in an hour the plant was in ruins. There is a prospect that the works will be rebuilt at Lorain, O. The board of trade of that place has made an offer of free land. The company employs 200 men.

Fire at Chicago, Feb. 27, destroyed the building 245-251 S. Jefferson St., owned by Charles Kaestner & Co., manufacturers of and dealers in mill machinery, engines, boilers, etc. The building was occupied by this concern and several other manufacturers. The losses were distributed as follows: Chas. Kaestner & Co., $175,000, on building and stock, insured for $133,500; Pioneer Paper Stock Co., loss on stock, $10,000; Henry R. Worthington, pumps, loss on stock, $18,000; Andrews & Johnson, ventilators, on stock, $10,000; Cutler Hammer Co., electrical supplies, on stock, $8,000; Raymond Bros., grinding and pulverizing machinery, on stock, $5,000; Smith Bros., saws, on stock, $10,000; Chicago Wind Motor Co., wind mills, on stock, $5,000. These were all occupants of space in the Kaestner Building. Other losses, sustained by neighboring concerns, were as follows: Crane Co., elevators and machinery, malleable and gray iron castings, etc., loss on building and stock, $85,000; W. D. Kent, foundry, loss on building and stock, $700; Daniel Munro, on building and stock, $150; Joseph Vierheilig, wagons and carriages, on building, $500; A. Kropp, machine shop and forge works, on stock, $200. The plant of the Crane Co., adjoining the Kaestner Building, was saved from destruction, but with considerable loss.

General Industrial Notes:—

The bar mill of theWhitaker Iron Works at Wheeling, started this week.

The Falcon Iron & Nail Co., Niles, O., has built a continuous mill.

South Erie Iron Works, a stove plant at Erie, Pa., will start up with a full force of men.

Wisconsin Malleable Iron Works at Milwaukee, secured boys to take the place of strikers.

The Top Mill blast furnace of the Wheeling Iron & Steel Co. will be blown in this week.

It is reported that E. J. Bird, Jr., is negotiating for the lease of the Etna furnace, of Ironton, O.

At Fairbanks, Morse & Co.'s plant, Beloit, Wis., 100 molders struck against a reduction in wages.

No. 1 furnace of the Sheridan Iron Co., Sheridan, Pa., has blown in. Both furnaces are now in blast.

Improvements have been made at the plant of the Baldwin Locomotive Works, at Philadelphia, recently, which involved the removal of all overhead shafting from the wheel shop, and the providing of each tool with an electric motor for motive

power. This improvement has increased the capacity, and has reduced the power required for operating the machines about 40 per cent.

Edgar Thomson Steel Works started up again on Saturday, March 2, and is expected to run on rails for the balance of the month.

Italians at Rosena furnace, New Castle, struck last week, according to a telegram from that place and their places were promptly filled.

The puddling department of the Elmira Steel & Iron Mills resumed work recently, after a shutdown of several weeks. Six puddling furnaces were fired.

At St. Mary's, O., the Bimel-Standish Mfg. Co., extensive dealers in iron and manufacturers of chain, have again gone into the hands of a receiver. Liabilities, $30,000.

Only five out of 28 puddling furnaces started at Moorhead Bros. & Co.'s plant at Pittsburg, Feb. 28. The rate is said to be $3, and some of the workers refused to accept that price.

The Arsenal Foundry Co., of Pittsburg, Pa., has gone out of business, and is succeeded by Presley S. Brown, who will continue the business at the old location, 2839 Smallman street.

G. T. Oliver, H. W. Oliver, D. B. Oliver, J. G. Oliver, Alex. Nimick and Cadwallader Evans, of Pittsburg, were elected directors of the Oliver Iron & Steel Co., at a meeting of the stockholders held recently.

Pittsburg workmen have gone into the Moor Iron Works at East St. Louis, starting the spike and bar mills. The new men are lodged within an enclosure at the works and guards are on hand to prevent interference by strikers.

Argument is to be made in the Superior court at Milwaukee on the distribution of assets in the hands of Receiver Kelly of the West Superior Iron & Steel Co. The balance in his hands realized from the operation of the plant is $68,000. The Central Trust Co. of New York and the Superior Land & River Improvement Co. each lays claim to the entire balance.

Receiver Wood, of the Maryland Steel Co., Sparrow's Point, Md., says that there is no truth in the report telegraphed from Pittsburg that his company has bid on any part of the $4,700,000 water improvement bond issue to be made by the city of Pittsburg. He had written to the Pittsburg authorities for information relative to the improvements contemplated, for the purpose of bidding for the work, if any of it was in his line. His letter was misconstrued, hence the bond-purchase story.

The Ironton (O.) *Register* notes the following concerning the iron industries in that vicinity: "Belfont furnace is running nicely and made 214 tons of iron Sunday and Monday. The product now is said to be the finest iron ever made. Kelly's nail mill is on. The factory runs five days a week. About half the nails made are being shipped on orders. There is not a large stock of steel on hand. The Ashland steel plant is not running, but may start up. Sarah furnace continues its splendid work, making about 100 tons of iron a day, all of which is loaded directly on the cars and sent to the Ashland steel plant. No other small furnace in the country is making a better record than Sarah.

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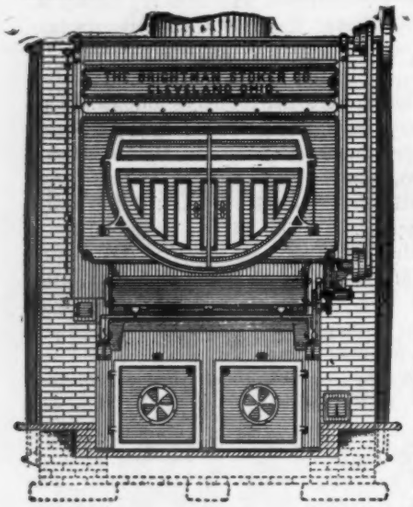
Special low rate excursion tickets with twenty day return limit will be sold March 5th, April 2d and 30th, from ticket stations on the Pennsylvania Lines to points in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia. For details, apply to nearest Pennsylvania Line Ticket Agent, or address F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburg, Pa.



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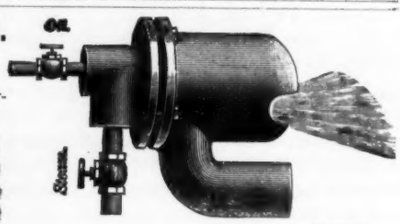

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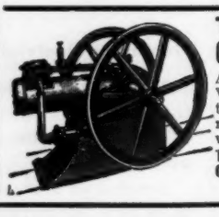

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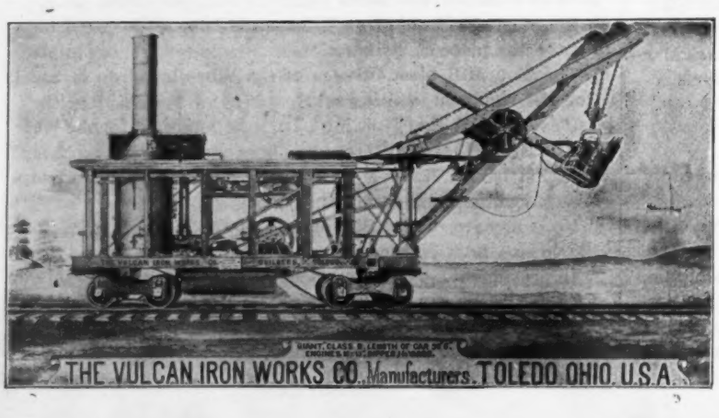

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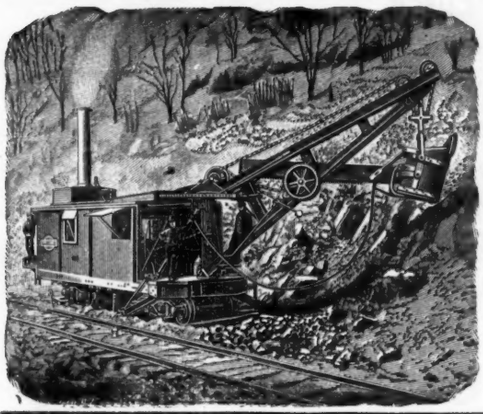

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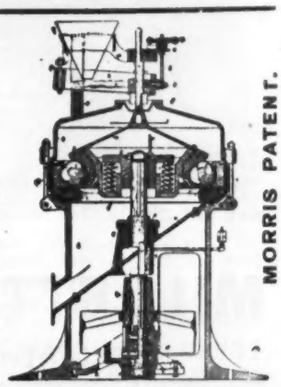

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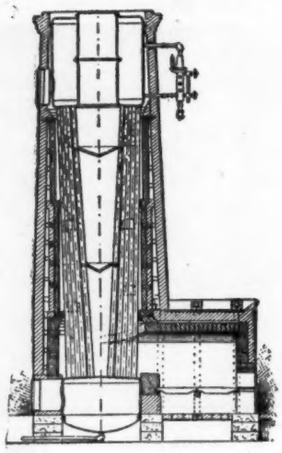

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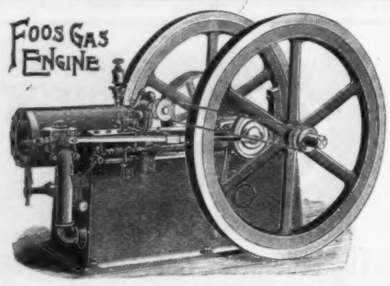

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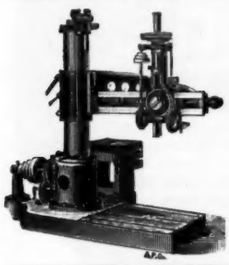

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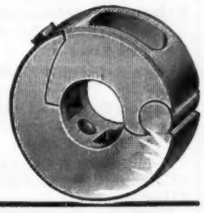

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Engineers' Supplies—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Engravers and Electrotypers—
Eclipse Electrotype & Engraving Co., Cleveland.
Cleveland Electrotype Foundry, Cleveland.

Engines (Gas)—
Otto Gas Engine Works, Philadelphia, Pa.
Van Dusen Gas Engine Co., Cincinnati, O.
Newell Bros., Cleveland, O.
Buckeye Mfg. Co., Union City, Ind.
Foos Gas Engine Co., Springfield, O.
Dayton Gas & Gasoline Engine Co., Dayton, O.

Engine Packing—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Engines (Steam)—
Wm. Tod & Co., Youngstown, O.
Brightman Stoker Co., Cleveland, O.
Armstrong Bros., Springfield, O.
The John F. Byers Machine Co., Ravenna, O.
Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.
Lane & Bodley Co., Cincinnati, O.
Pen Argyl Iron Works, Pen Argyl, Pa.
Westinghouse Machine Co., Pittsburg, Pa.
B. F. Sturtevant Co., Boston, Mass.

Exhaust Heating Apparatus—
B. F. Sturtevant Co., Boston, Mass.

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Fans—
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B. F. Sturtevant Co., Boston, Mass.

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C. H. Besly & Co., Chicago, Ill.

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Milwaukee Fdy. Supply Co., Milwaukee, Wis.

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Union Mining Co., Mt. Savage, Md.
Westmoreland Fire Brick Co., Pittsburg, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
American Fire Brick & Clay Co., Mineral Point, Ohio.
Reese, Hammond & Co., Bolivar, Pa.
Clearfield Fire Brick Co., Clearfield, Pa.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Cleveland Facing Mill Co., Cleveland, O.
Stowe, Fuller & Co., Cleveland, O.
Dover Fire Brick Co., Cleveland.
F. B. Stevens, Detroit, Mich.

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Fire Proof Covering—
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Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Flue Scrapers—
Ed. Wertheim, Chicago.

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W. F. & John Barnes Co., Rockford, Ill.
Hill, Clarke & Co., Chicago, Ill.
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Lodge & Shipley Machine Tool Co., Cincinnati.

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Brightman Stoker Co., Cleveland, O.
The Lloyd-Booth Co., Youngstown, O.
Taylor & Boggis Foundry Co., Cleveland, O.
Wm. Tod & Co., Youngstown, O.
S. Freeman & Sons Mfg. Co., Racine, Wis.
Vulcan Iron Works Co., Toledo, O.

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Clearfield Fire Brick Co., Clearfield, Pa.
Millett Core Oven Co., Brightwood, Mass.
Ohio Sand Co., Conneaut, O.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.
Cleveland Facing Mill Co., Cleveland, O.
Tabor Mfg. Co., New York City.
The Springfield Cupola Co., Springfield, O.
Chicago Chemical Solution Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.

Forgings—
Cleveland City Forge & Iron Co., Cleveland.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.
American Fire Brick & Clay Co., Mineral Point, Ohio.
Milwaukee Fdy. Supply Co., Milwaukee, Wis.

Fuel Oil Burners—
Thurman Fuel Oil Burner Co., Indianapolis, Ind

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Brightman Stoker Co., Cleveland, O.
Warren, Webster & Co., Camden, N. J.

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Pen Argyl Iron Works, Pen Argyl, Pa.
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Hoisting Blocks—
Moore Mfg. & Foundry Co., Milwaukee, Wis.

Hoisting Engines—
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C. W. Hunt Co., New York City.
Pen Argyl Iron Works, Pen Argyl, Pa.
Vulcan Iron Works Co., Toledo, O.
W. A. Crook & Bro's Co., Newark, N. J.

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United States Heater Co., Detroit, Mich.

House Heaters—
United States Heater Co., Detroit, Mich.

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G. B. Schulte Sons Co., Cincinnati, O.
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Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Geo. H. Sibell & Co., Chicago, Ill.
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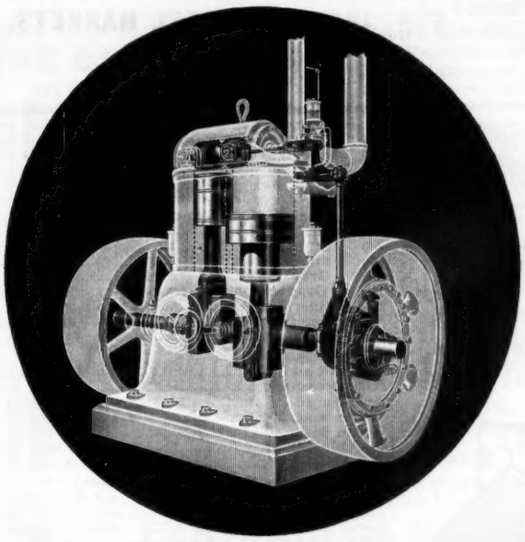

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Deming Co., Salem, O.

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Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.

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Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Fox Machine Co., Grand Rapids, Mich.
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Brightman Stoker Co., Cleveland, O.

Smokeless Furnaces—
Brightman Stoker Co., Cleveland, O.

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Lodge & Shipley Machine Tool Co., Cincinnati.

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Keasbey & Mattison Co., Ambler, Pa.
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago Ill

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C. H. Besly & Co., Chicago, Ill.

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Bethlehem Iron Co., South Bethlehem, Pa.

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Brightman Stoker Co., Cleveland, O.

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Cleveland City Forge & Iron Co., Cleveland.

Tanks—
S. Freeman & Sons Mfg. Co., Racine, Wis.
Enterprise Boiler Co., Youngstown, O.

Tinning Machinery—
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Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.
C. H. Besly & Co., Chicago, Ill.

Twist Drills—
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Manufacturers' Tool Supply Co., Chicago.
C. H. Besly & Co., Chicago, Ill.

Valves—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Ventilating Fans—
Brightman Stoker Co., Cleveland, O.

Washers—
Milton Mfg. Co., Milton, Pa.

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McCallip Fence Co., Columbus, O.

Wire Goods—
McCallip Fence Co., Columbus, O.

Wire Rope—
W. A. Crook & Bro's Co., Newark, N. J.
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M. H. KILGALLEN, Gen'l Mgr. CHICAGO

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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No. 1 Bessemer hematite	2.75@ 3.00
Hematites No. 1 non-Bessemer	2.00@ 2.50
No 1. Specular, non-Bessemer	2.35@ 3.00

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CLEVELAND (f. o. b. cars):	
Bessemer	$10 00@$10 25
No. 1 Strong Foundry	10 75@ 11 00
No. 2 Strong Foundry	9 75@ 10 00
No. 1 Gray Forge, red short	9 10@ 9 25
No. 2 Gray Forge, neutral	9 00@ 00 00
No. 1 American Scotch	11 00@ 00 00
No. 2 American Scotch	10 00@ 00 00
Lake Superior Charcoal	13 00@ 13 50
PITTSBURG:	
No. 1 Foundry	$11 25@$11 75
No. 2 Foundry	10 25@ 10 75
Gray Forge	9 10@ 9 25
White and Mottled	9 00@ 0 00
Warm Blast Charcoal	17 00@ 18 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	10 10@ 10 25
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 00@$13 50
Local Coke Foundry No. 1	10 25@ 10 50
Local Coke Foundry No. 2	9 75@ 10 00
Local Coke Foundry No. 3	9 40@ 9 65
Local Scotch Foundry No. 1	10 25@ 10 50
Local Scotch Foundry No. 2	9 75@ 10 00
Local Scotch Foundry No. 3	9 50@ 9 75
Southern Coke No. 1	11 00@ 11 25
Southern Coke No. 2	10 00@ 10 25
Southern Coke No. 3	9 50@ 9 75
Southern No. 1 Soft	10 00@ 10 25
Southern No. 2 Soft	9 75@ 10 00
Southern Silveries No. 1	11 50@ 11 75
Southern Silveries No. 2	11 25@ 11 50
Jackson Co. Silveries	15 00@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	12 50@ 13 00
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	11 00@ 11 50
Coke Bessemer	11 00@ 11 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 9 50@$10 00
Southern Coke No. 2 and No. 1 Soft	9 00@ 9 25
Hanging Rock Coke, No 1	11 50@ 12 00
Hanging Rock Charcoal No. 1, Fdy	15 00@ 16 50
Tennessee Charcoal No 1	13 00@ 14 00
Jackson County Stone Coal No 1	14 00@ 14 50
Southern Coke, Gray Forge	8 25@ 8 50
" " Mottled	8 00@ 8 25
Standard Alabama Car Wheel	15 00@ 16 00
Tennessee " "	14 50@ 15 00
Lake Superior " "	13 50@ 14 00
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 00
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 50
Ohio Strong Softener No. 1	11 10
Jackson Co. Silvery No. 1	15 50
Lake Superior Charcoal	13 75
Southern Soft No. 1	11 00
Hanging Rock Charcoal	18 50
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$10 25@$10 50
Southern Coke No. 2	9 75@ 10 00
Southern Coke No. 3	9 25@ 9 50
Southern Gray Forge	9 00@ 9 25
Southern Charcoal No. 1	14 00@ 14 50
Missouri Charcoal No. 1	12 50@ 13 00
Ohio Softeners	14 00@ 14 50
Lake Superior Car Wheel	15 50@ 16 00
Southern Car Wheel	16 00@ 16 50
Connellsville Coke, St. Louis	4 40

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	Gross Tons
Old iron rails	$12 50
Old steel rails	10 00
	Net Tons
No. 1 R. R. wrought scrap	$ 9 00
No. 1 wrought scrap	8 00
No. 1 Machine cast scrap	8 00
Iron axles	14 50
Axle turnings	7 50
Wrought turnings (free from cast)	6 50
Cast borings	5 50
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 00
Tank iron	7 50
Hoop and band iron	6 00
Sheet iron	5 50
Wrought drillings	6 50
Malleable iron	8 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.30c@1.35c
Angles	1.20c@1.25c
Tees	1.35c@1.45c
Universal Plates	1.20c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 10
4½ to 6 by ⅜ to 1 inch	1 15
1½ to 6 by 1⅛ to 2 inch	1 30
1¼ & 1⅜ by ⅜ to ¾ inch	1 15
1 & 1⅛ by ⅜ to ¾ inch	1 20
⅛, ¾, ⅞, by ⅜ to ⅝ inch	1 30

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

THE CADY MFG. CO.

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AUTOMATIC MACHINERY.
Power Presses, Dies, Drop Hammers, Punches and Shears, Wire Straighteners and Cutters, Wire Forming Machines
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AGRICULTURAL MACHINERY,

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

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HAMILTON, OHIO, U. S. A.

Manufacturers of Belt, Steam and Electrically driven

POWER PUNCHES AND SHEARS,

for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc.

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MANUFACTURERS OF HIGH GRADE FIRE BRICKS.
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DIXON'S GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.

Tin roofs well painted have not required repainting for 10 to 15 years.

If you need any paint it will pay you to send for circular.

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Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,
CLEVELAND, OHIO.

ORDER DIRECT FROM THE
Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Subscribe for The Iron Trade Review, $3 per year.

Round and Square.

1 to 1⅞ inch	1 10
2 to 2½ inch	1 20
2⅝ to 3¼ inch	1 35
3⅜ to 4 inch	1 60
4⅛ to 4½ inch	2 20
4¾ to 5 inch	2 40

Oval.

⅜ to 1¼ inch	1 30
⅜ to ¾ inch	1 30
½	1 50
⅝	1 70

Half Oval and Half Round.

1¼ to 3 inch	1 65
¾ to 1⅛ inch	1 45
⅜ to ¾ inch	1 70
½	1 85
⅝	2 95

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 20
1 to 1¾ by ¼ and 5-16 inch	1 25
¼ to ⅜ by ¼ and 5-16 inch	1 35
½ to ⅝ by ¼ and 5-16 inch	1 60

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 65
1 7-16 to 2, No. 17, 18 and 19	1 70
1 7-16 to 2, No. 20	1 80
1 7-16 to 2, No. 21	1 90
1 7-16 to 2, No. 22	2 00
1⅛ to 1⅜, No. 13, 14 and 15	1 70
1⅛ to 1⅜, No. 16, 17 and 18	1 75
1⅛ to 1⅜, No 19 and 20	1 80
1⅛ to 1⅜, No. 21	1 90
1⅛ to 1⅜, No. 22	2 00
15-16 and 1 inch, No. 13, 14 and 15	1 65
15-16 and 1 inch, No. 16, 17 and 18	1 80
15-16 and 1 inch, No. 19 and 20	1 90
15-16 and 1 inch, No. 21	2 00
15-16 and 1 inch, No. 22	2 10
⅞, No. 13, 14 and 15	1 90
⅞, No. 16, 17 and 18	2 00
⅞, No. 19 and 20	2 10
⅞, No. 21	2 20
⅞, No. 22	2 30
13-16, No. 13, 14 and 15	2 00
13-16, No. 16, 17 and 18	2 10
13-16, No. 19 and 20	2 20
13-16, No. 21	2 30
13-16, No. 22	2 40
¾, No. 13, 14 and 15	2 10
¾, No. 16, 17 and 18	2 25
¾, No. 19 and 20	2 35
¾, No. 21	2 45
¾, No. 22	2 55
11-16, No. 13, 14 and 15	2 35
11-16, No. 16, 17 and 18	2 40
11-16, No. 19 and 20	2 50
11-16, No. 21	2 60
11-16, No. 22	2 70
11-16, No. 23	2 80
⅝, No. 13, 14 and 15	2 40
⅝, No. 16, 17 and 18	2 50
⅝, No. 19 and 20	2 60
⅝, No. 21	2 70
⅝, No. 22	2 80
⅝, No. 23	2 90
9-16, No. 13, 14 and 15	2 60
9-16, No. 16, 17 and 18	2 70
9-16, No. and 20	2 80
9-16, No. 21	2 90
9-16, No. 22	3 00
9-16, No. 23	3 10
7-16 and ½ inch, No. 13, 14 and 15	2 80
7-16 and ½ inch, No. 16, 17 and 18	2 90
7-16 and ½ inch, No. 19 and 20	3 00
7-16 and ½ inch, No. 21	3 10
7-16 and ½ inch, No. 22	3 20
7-16 and ½ inch, No. 23	3 30
⅜, No. 13, 14 and 15	3 30
⅜, No. 16, 17 and 18	3 40
⅜, No. 19 and 20	3 50
⅜, No. 21	4 80
⅜, No. 22	3 90
⅜, No. 23	4 05

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 40
1½ to 6 by Nos. 11 and 12	1 45
1 to 1¾ by ⅛ to 3-16 inch	1 45
1 to 1¾ by Nos. 11 and 12	1 50
⅞ and 13-16 by ⅛ to 3-16 inch	1 60
⅞ and 13-16 by Nos. 11 and 12	1 65
¾ and 11-16 by ⅛ to 3-16 inch	1 70
¾ and 11-16 by Nos. 11 and 12	1 75
⅝ and 9-16 by ⅛ to 3-16 inch	1 85
⅝ and 9-16 by Nos. 11 and 12	1 90
½ by ⅛ to 3-16 inch	2 00
½ by Nos. 11 and 12	2 05

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 60
⅞ inch, " " " " 13 and 14	1 70
¾ inch, " " " " 11 and 12	1 75
¾ inch, " " " " 13 and 14	1 85

Sheet Iron.

No. 10	1 65
No. 12	1 75
No. 14	1 80
No. 15-17	1 90
No. 18	2 05
No. 20	2 20
No. 22-24	2 30
No. 25-26	2 40
No. 27	2 50

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 50
Shell	1 70
Flange	1 80
Marine Flange	2 10
Fire Box	3 00

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½

HOISTING MACHINERY for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling, and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting, Mining Purposes and Suspension Cable Ways.

Send for Illustrated Catalogue giving full description, etc.

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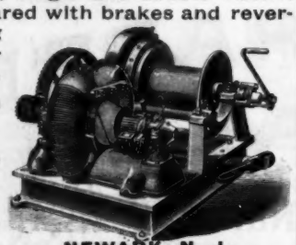

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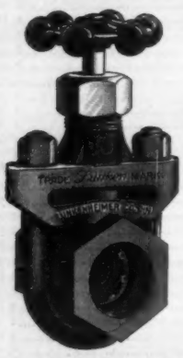
HOISTING AND CONVEYING MACHINERY

For moving all kinds of material in Steam Power Stations, Factories, Gas Works, Mines, Coal Yards, etc.

Tip Cars, Wire Rope, Barrows.

INDUSTRIAL RAILWAYS.



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THE VALVE WONDER OF THE AGE.

Like Elbows and Tees and other Pipe Fittings—these Valves are made of **IRON** in ¼ to 3-inch sizes (screwed ends), but the **Renewable** Seat, Disk, Stem, Wedge and Stuffing Box are of brass.

The best and strongest Valve for general purposes, up to **150 lbs. pressure**, to supersede all other styles of Gate Valves—because it is better and costs much less—why?—because iron is cheaper than brass and more rigid.

Compact, Simple, Strong and Low Priced.

Better than Valves costing three times as much,

An ideal Valve—A perfect valve.

Write for prices on **IRON** "Lunken" Valves, also new catalogue. Consult dealer.

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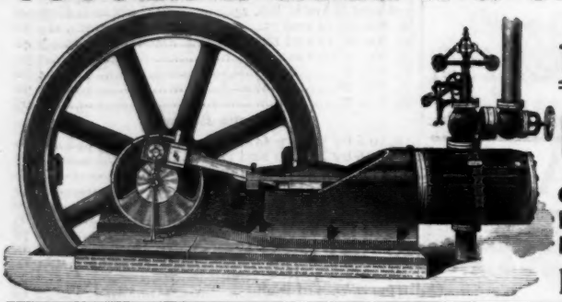

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ENGINE,

Chilled and Sand Rolls and Rolling Mill Machinery.

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"O.K." CROWN

High Grade Fire Brick, with that used by **ANY** other Fire Brick-maker, and you will understand why, they have stood the **TEST** for **TWENTY-TWO LONG YEARS**

Our Prices are Just ...Right...

OAK HILL FIRE BRICK AND COAL CO.
MANUFACTURERS
OAK HILL, OHIO

7-16 to ⅝ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅜ to 11-16 and 4⅛	.10
⅛ to 6 in.	.10½
¼ to 9-32 and 6⅛ to 7 in.	.11
16 i n	.13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Machinery	base price, 1 50
Tire	" 1 60
Spring	" 2 10
Sleigh Shoe	" 2 00
Toe Calk	" 2 05
Cutter Shoes, tapered and bent	" 2 10

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 00

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ lb 9@10
Wright's	℔ lb 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 to Flour, C. F		
	46 gr.	150 gr.	F. FF.
Kegs, ℔ lb	4½c	5 c	2½c
½ kegs ℔ lb	4¾c	5¼c	2¾c
¼ kegs ℔ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6¼c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

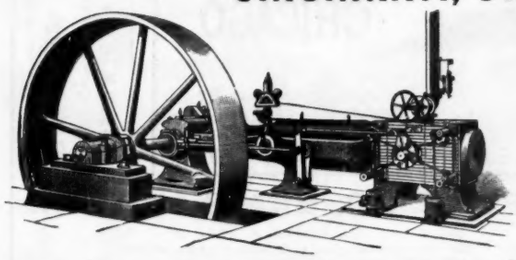
Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70

THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



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Simple and Compound.

Shafting, Hangers, Pulleys.

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Have You Any Sand?

On your castings that you want removed?

If so,

Will clean them better than any other method.

Try It.

Chicago Chemical Solution Mfg. Co.

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Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†2:45 pm	*12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Saturdays the 8:00 pm train will leave at 11:20 pm.

Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster		*6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	†11:00 A M

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Bolt and Nut Works.

THE UPSON NUT CO., Manufacturers of Nuts, Washers, Carriage, Machine, Plow and Elevator Bolts, Coach Screws, etc.

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offers **Free Factory Sites** and other inducements.

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Iron Ore, Pig Iron

AND METALS.

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Successors to Tuttle, Oglebay & Co.

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Builders of Machinery for Hardware Manufacture.

AUTOMATIC

Wire Straightening and Cutting Machines,

BUTT MILLING MACHINERY,

Butt Drilling Machinery,

Riveting Machines

Foot Presses,

Sprue Cutters, Etc.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¾	3½
Hexagon	15½	11½	8⅝	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ¼c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$1.10
{ Less than car lots	$1.25

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	₩ lb 9@10
Russia " "	₩ lb 14
Italian " "	₩ lb 13@19
Plumbago Piston	₩ lb 40
Peerless	₩ lb 60
Morrison's "	₩ lb 45
Square Flax "	₩ lb 50
Sheet Rubber	₩ lb 12&24
Excelsior Rubber	₩ lb 48
Rainbow { Full Rolls	45c ₩ lb
Rainbow { Less than Full Rolls	50c ₩ lb
Eclipse Gasket	₩ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Rivets.

Iron, Thousand, list November 17, 1887	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17, 1887	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65&
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Feuce, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

Perforated Filter Press Plates.

THE HARRINGTON & KING PERFORATING CO. CHICAGO.

BRONZE SCREEN PLATES To withstand action of ACIDULATED WATERS.

PERFORATORS OF STEEL, IRON, COPPER, ZINC, BRASS AND TIN.

For use in GRAIN CLEANING AND MINING MACHINERY, WOOLEN, COTTON, PAPER AND PULP MILLS, RICE, FLOUR AND COTTON SEED OIL MILLS, SUGAR AND MALT HOUSES. DISTILLERIES, FILTER PRESSES. STONE, COAL, AND ORE SCREENS, BRICK AND TILE WORKS, FILTERS, SPARK ARRESTERS, GAS AND WATER WORKS, OIL, GAS AND VAPOR STOVES, COFFEE MACHINERY, ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

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WHEELER'S PATENT VERTICAL WATER TUBE BOILER.

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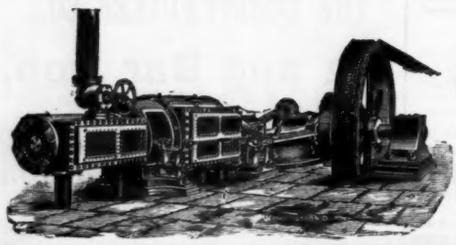

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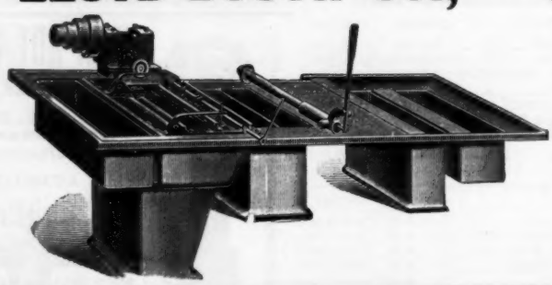

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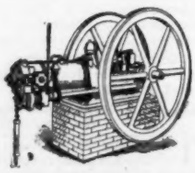

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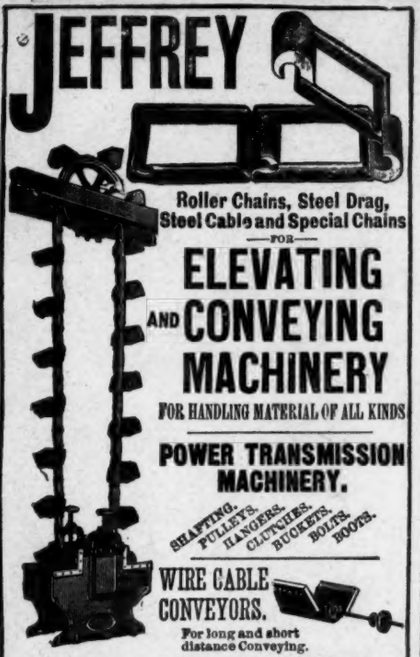

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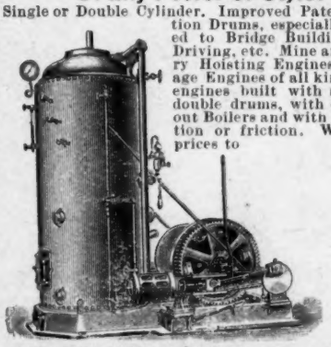

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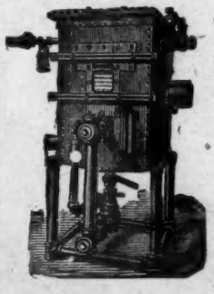

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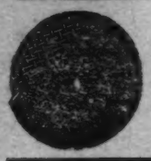

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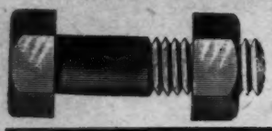

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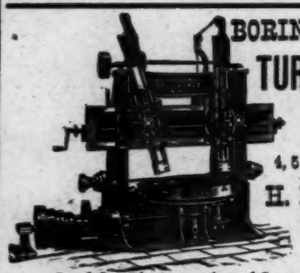

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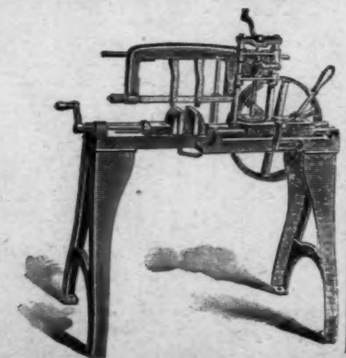

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